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# ACORN USER

JANUARY 1986

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Joe Telford writes a wordprocessor

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Our advanced user's guide

**BASIC AIDS:**
The hard facts about debuggers

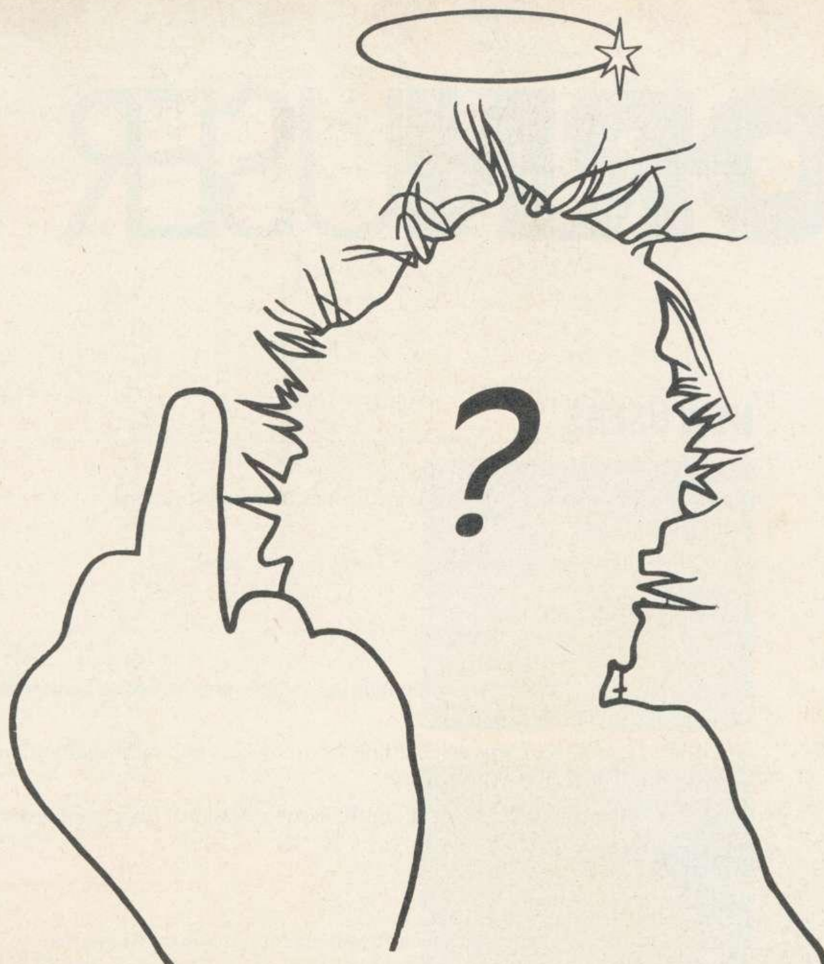
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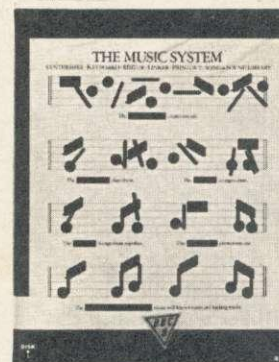
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The Music System is the most advanced micro based music program for the BBC microcomputer.




It features unparalleled facilities for creating, editing, playing and printing tunes whilst still being simplicity itself to use.

The Song and Sound Library gives you a good start and the acclaimed Instruction Manual leaves little to the imagination.

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**SYSTEM SOFTWARE** 

# ACORNUSER

ISSUE No 42 JANUARY 1986




## NEW USERS



## BUSINESS



## EDUCATION



## REVIEWS



## REGULARS




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ABC

## COVER




Cover illustration by Jonathan Inglis from a screenshot created with the *Super Painter* program in this issue

## NEXT MONTH

SHRINKING SCREENS
Save precious memory by creating smaller screens
Software for sideways ROMs
Make the most of the B+ and B+128's extra memory
Add extra commands to Basic
Members of Ultravox review the Umi music interface

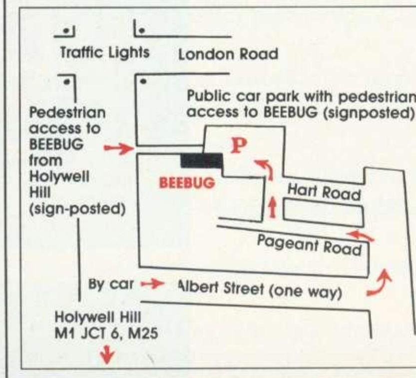
BEEBUG RETAIL

# BEEBUG SHOWROOM AND MAIL ORDER

**The products in this price list are available in our showroom in St.Albans and by mail order. Telephone your order on 0727 40303 or send the order form to the address below. Alternatively come along and see us. We are open 9 - 5.30 Mon - Sat, and there is ample parking at the rear of our premises.**

We take both Access and Visa credit cards. Simply telephone us on our multi-line telephone number 0727 40303 quoting: Cardholder's Name, Cardholders Address, Cardholder's Telephone number, Credit Card number, expiry date, order details.

PLEASE NOTE: that the mail order despatch address must be the same as the cardholder's address.




BEEBUG MAIL ORDER
Dolphin Place, Hollywell Hill,
St.Albans, Herts. AL1 3YS
Tel: 0727 40303 — Multi-lines

- Computers
- Printers
- Monitors
- Disc Drives
- Budget Discs
- Software

## COMPUTERS

**BBC B Plus**
There are now two versions of this machine, the standard 64K with shadow screen memory at £459, and a 128K model at £489 with a special Basic and 64K user ram available for programs!

**ADFS/1770 Interface**
The Advanced Disc Filing System is now available at £29, offering a 60% increase in storage space and a large number of files per disc.

The 1770 Interface at £49 gives increased speed over the 8271 interface and has inbuilt format and verify routines.

**Second Processors**
At £189 the 6502 second processor remains the best way of adding memory; invaluable for word processing and spreadsheet users.

**Disc Interface Offer**
As the B Plus has a disc interface fitted as standard it seems that support for tape users may dwindle in future. To overcome this Beebug Mail Order is offering the Acorn 1.2 DNFS Disc Interface Kit at £89 until January 1st. The 1.2 DNFS is not part of the usual DFS upgrade and so this offer is only available while stocks last. We are also offering a Starter Pack for newcomers to the Disc Filing System comprising an Acorn 1.2 DNFS upgrade kit, Cumana CSX100 40T disc drive and a box of 10 Beebug Discs, all for £179.

| Code | Description | Price inc. VAT |
|---|---|---|
| 0202 | BBC B Plus Computer | 459.00 |
| 0220 | BBC B+ with Econet | 499.00 |
| 0221 | BBC B+ 128K | 489.00 |
| 0203 | '6502' 2nd Processor | 189.00 |
| 0204 | 'Z80' 2nd Processor | 389.00 |
| 0205 | Acorn Prestel Adaptor | 129.00 |
| 0206 | Acorn Teletext Adaptor | 139.00 |
| 0210 | A to B Upgrade Kit | 69.00 |
| 0212 | Acorn Speech Upgrade | 46.00 |
| 0209 | 1.2 DNFS Rom | 19.50 |
| 0217 | 1770 Disc Interface Upgrade Kit | 49.00 |
| 0218 | ADFS Rom for 1770 DFS | 29.00 |
| 0213 | Watford DFS Rom and Manual | 26.50 |
| 0214 | Watford DDFS Rom + Manual | 98.00 |
| 0216 | Watford DFS Manual | 6.95 |
| 0219 | Watford DFS Kit | 85.00 |
| 0223 | Acorn 1.2 DNFS upgrade | 89.00 |
| 0222 | Disc Starter Pack | 179.00 |

## DISC DRIVES

Cumana drives are used widely in the Beebug offices and seem particularly robust.

The 80 track drives are all switchable to 40 track and the 800k CD800S will satisfy most data storage requirements.

Our BEEBUG Discs all come in free plastic storage boxes — worth up to £9.00 for 25 or 50 Discs.

| Code | Description | Price inc. VAT |
|---|---|---|
| 0600 | Cumana 100K CSX100 40T | 97.00 |
| 0610 | Cumana 100K CS100 40T | 127.00 |
| 0601 | Cumana 200K CDX200 40T | 187.00 |
| 0602 | Cumana 400K CSX400 40/80T | 113.00 |
| 0603 | Cumana 400K CS400 40/80T | 133.00 |
| 0604 | Cumana 800K CD800S 40/80T | 252.00 |
| 0605 | Watford 200K CLS200 40T | 97.00 |
| 0606 | Watford 400K CLS400S 40/80T | 133.00 |
| 0607 | Watford 400K CS400S 40/80T | 149.99 |
| 0608 | Watford 800K CD800S 40/80T | 270.00 |
| 0650 | Memorex Discs S/S D/D 48TPI 3481 | 15.50 |
| 0651 | Memorex Discs D/S D/D 96TPI 3501 | 25.50 |
| 0652 | Memorex Disc Head Cleaning Kit | 9.65 |
| 0653 | Library Case — 10 discs | 2.25 |
| 0654 | Disc Storage box — 25 discs | 9.00 |
| 0655 | Lockable Disc Box (35) | 13.80 |
| 0656 | Lockable Disc Box (80) | 17.25 |
| 0657 | 10× 48TPI SS DD Discs | 14.40 |
| 0658 | 10× 48TPI DS DD Discs | 20.00 |
| 0659 | 10× 96TPI SS DD Discs | 20.00 |
| 0660 | 10× 96TPI DS DD Discs | 21.40 |
| 0661 | 25× 48TPI SS DD Discs | 33.90 |
| 0662 | 25× 48TPI DS DD Discs | 45.19 |
| 0663 | 25× 96TPI SS DD Discs | 45.19 |
| 0664 | 25× 96TPI DS DD Discs | 48.90 |
| 0665 | 50× 48TPI SS DD Discs | 58.30 |
| 0666 | 50× 48TPI DS DD Discs | 81.40 |
| 0667 | 50× 96TPI SS DD Discs | 81.40 |
| 0668 | 50× 96TPI DS DD Discs | 92.49 |

## OTHER HARDWARE

**Roms and Rams**
The 2764 8K eprom is only £2.30 and the 27128 16K eprom now £3.45. The Aries B32 Ram board is good value at £91.

**Modem Mania**
Other price reductions are the Nightingale Modem at £120, and the accompanying Commstar for £33.

**Joysticks**
We can fully recommend the Voltmace 3B joysticks at £12 and £19.95 for single and twin models repectively. Just the thing to make the best of our new software!

| Code | Description | Price inc. VAT |
|---|---|---|
| 0700 | Aries B20 RAM Card | 86.50 |
| 0701 | Aries B32 RAM Card | 91.00 |
| 0702 | Watford 32K RAM Card | 69.00 |
| 0703 | AMX Mouse | 79.95 |
| 0704 | ATPL Sidewise ROM Board | 39.00 |
| 0705 | 2764 8K eprom | 2.30 |
| 0706 | 27128 16K eprom | 3.45 |
| 0707 | 6264 8K ram | 7.50 |
| 0708 | Eprom Extractor | 5.00 |
| 0709 | Eprom Eraser | 32.20 |
| 0710 | Softlife Eprom Blower | 75.90 |
| 0711 | Nightingale Modem | 120.00 |
| 0712 | Pace Commstar | 33.00 |
| 0713 | Phone 2 into 1 adaptor | 6.32 |
| 0714 | BBkey Function Key Labels | 2.00 |
| 0717 | Watford Sideways ZIF | 17.25 |
| 0718 | Voltmace Delta 3B Single Joystick | 11.99 |
| 0719 | Voltmace Delta 3B Twin Joystick | 19.95 |
| 0720 | Voltmace Delta 14B Joystick | 14.95 |
| 0721 | Voltmace Delta 14B/1 Interface | 14.85 |
| 0722 | 13 amp 4-way plug block Extension | 10.35 |
| 0723 | Pocket Screwdriver | 0.26 |
| 0724 | Antex CN17 Soldering Iron | 6.79 |
| 0725 | 13 amp plugs | 0.86 |
| 0726 | 8 way DIP switch | 0.98 |
| 0727 | RS423 domino plug | 0.46 |
| 0728 | RGB 6 pin DIN plug | 0.46 |
| 0729 | Cassette 7 pin DIN plug | 0.30 |
| 0730 | 3-core 6 amp Mains Cable (per m) | 0.35 |
| 0731 | 4-core RS423 Cable (per m) | 0.20 |
| 0732 | 6-core RGB or Cassette Cable (per m) | 0.25 |
| 0733 | Safebloc Test Connector | 11.50 |
| 0734 | BBC Replacement Keyboard | 46.00 |
| 0735 | ATPL Battery Backup kit | 17.00 |

## SOFTWARE

We have expanded our range of software to include major titles such as Elite, Revs, White Knight Mk 12 and Aviator.

ISO Pascal at £69 continues to be the best structured alternative to Basic.

The Basic Editor is selling well at £29, as is the Graphics Extension Rom (GXR) at £29 (please specify B or B+).

| Code | Description | Price inc. VAT |
|---|---|---|
| 1000 | Acornsoft View | 53.00 |
| 1001 | Acornsoft View Sheet | 53.00 |
| 1002 | Acornsoft Hi-View | 55.00 |
| 1003 | Acornsoft Lisp Rom | 49.00 |
| 1004 | Acornsoft BCPL | 56.00 |
| 1005 | Acornsoft Comal | 49.00 |
| 1006 | Acornsoft Logo | 69.00 |
| 1007 | Acornsoft ISO Pascal | 69.00 |
| 1008 | Acornsoft Basic Editor | 29.00 |
| 1009 | AMX Desk | 21.95 |
| 1010 | AMX Utilities | 13.45 |
| 1011 | BBCsoft UltraCalc 2 | 75.00 |
| 1012 | Acornsoft Elite Disc Version | 17.00 |
| 1013 | View Printer Driver Cassette | 9.90 |
| 1014 | View Printer Driver Disc | 11.50 |
| 1015 | Revs Disc | 17.00 |
| 1016 | Aviator Disc | 17.00 |
| 1100 | Wordwise Plus | 52.90 |
| 1112 | Hi Wordwise Plus Disc | 6.50 |
| 1102 | Wordwise | 35.00 |
| 1106 | Accelerator | 58.90 |
| 1109 | Disc Doctor | 28.00 |
| 1103 | C.C.Graphics ROM | 28.00 |
| 1110 | Intersheet | 51.35 |
| 1111 | Hi Intersheet Disc | 6.50 |
| 1104 | Printmaster (Epson) | 28.00 |
| 1105 | Printmaster (Star) | 28.00 |
| 1107 | Speech ROM | 30.00 |
| 1108 | Acorn Speech Processor | 10.00 |
| 1118 | White Knight Mk 12 Disc | 19.00 |
| 1119 | White Knight Mk 12 Cassette | 9.50 |
| 1017 | GXR B | 29.00 |
| 1018 | GXR B+ | 29.00 |
| 1114 | Interchart | 29.00 |

## PRINTERS

**Daisywheel Offer**
Beebug Mail Order are offering the Juki 6100 Daisywheel which provides true letter quality print at only £359. This low price is unlikely to be repeated or maintained!

**New Epson Offer**
The new Epson LX80 printer is proving very popular and so we offer a combined package of the LX80 with its tractor feed unit for only £274.

**Printer Accessories**
Due to the costs of sending our Printer Paper through the post we must now charge a carriage of £2 per box, in addition to normal carriage charges. The price of £14.50 is for single boxes and, as with all our goods, we would be pleased to quote to schools and industry for larger quantities.

**Platten Cleaner Kit**
A specially designed pad allows you to remove all traces of ink and other dirt from your printer platten using the special solvent supplied.

| Code | Description | Price inc. VAT |
|---|---|---|
| 0300 | Brother HR 15 Daisywheel | 373.75 |
| 0301 | Canon PW1080A 10" | 340.00 |
| 0302 | Canon PW1156A 15" | 405.00 |
| 0303 | Canon PJ1080A colour | 460.00 |
| 0304 | Epson LX 80 | 270.00 |
| 0305 | Epson RX 100 | 392.00 |
| 0306 | Epson FX 80 | 362.00 |
| 0307 | Epson FX 100 | 490.00 |
| 0308 | Epson JX 80 colour | 569.00 |
| 0309 | IBICO LTR1 Letter Quality | 138.50 |
| 0310 | Juki 6100 Daisywheel | 359.00 |
| 0311 | Kaga KP 810 | 263.35 |
| 0312 | Linear Graphics Plotmate | 333.50 |
| 0313 | LX80 Tractor Feed Unit | 23.00 |
| 0314 | LX80T Offer Package | 274.00 |
| 0400 | 2m Printer Lead | 10.00 |
| 0401 | Platen Cleaner Kit | 6.00 |
| 0402 | Epson FX80/RX80 Ribbon | 5.00 |
| 0403 | Epson FX100/RX100 Ribbon | 10.00 |
| 0404 | Juki 6100 Daisywheel (Wheel) | 20.50 |
| 0405 | Brother HR-15 Daisywheel (Wheel) | 20.50 |
| 0406 | 11"×9.5" P/Paper (2000) | 14.50 |
| 0407 | 3.5"×1.44" Labels (1000) | 5.00 |
| 0408 | Canon PW/Kaga Taxan Ribbon | 6.79 |
| 0411 | HR-15 Correctable Ribbon | 4.30 |
| 0412 | HR-15 Nylon Ribbon | 4.30 |
| 0413 | LX 80 Replacement Ribbon | 5.50 |
| 0414 | Ibico Ink Roller | 4.60 |
| 0415 | Epson JX80 Ribbon | 14.95 |

## MONITORS

**Colour**
One of the best monitors for high resolution graphics is the Sanyo 3115. It is used in the Beebug offices and is a serious competitor to the Microvitec 1451 at only £449.

| Code | Description | Price inc. VAT |
|---|---|---|
| 0500 | Kaga 1201 G Hi-res Green | 103.50 |
| 0501 | Kaga 1202G Ultra Hi-res Green | 120.75 |
| 0502 | Kaga 1203A Ultra Hi-res Amber | 120.75 |
| 0503 | Zenith 123 12" Green | 75.90 |
| 0530 | Microvitec 1431 Med-res Monitor | 218.50 |
| 0531 | Microvitec 1451 Hi-res Monitor | 276.00 |
| 0532 | Philips CT2007 14" TV Monitor | 225.00 |
| 0533 | Sanyo Very Hi-res 14" Monitor 3115 | 449.00 |
| 0550 | 1.0m Monitor Lead RGB | 5.75 |
| 0551 | 1.0m Monitor Lead BNC Zenith/Kaga | 3.45 |
| 0552 | Single Plinth for Monitor | 12.65 |
| 0553 | Double Plinth for Monitor | 21.85 |
| 0554 | Memorex TV and VDU Cleaning Kit | 4.51 |

# ORDER FORM

**CARRIAGE.** Please **add £1.00** carriage to all orders except Computers, Monitors, and Printers **add £7.00.** Disc Drives, 2nd Processors, Modems etc. **add £5.00.** Listing Paper **add £2.00.**

**BEEBUG MAIL ORDER**
Dolphin Place, Holywell Hill, St.Albans, Herts. AL1 1EX
(Dolphin Place is opposite 18 Holywell Hill in the centre of St.Albans).

| CODE | QUANTITY | DESCRIPTION | UNIT PRICE | TOTAL |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

NAME: SUB TOTAL £

ADDRESS: CARRIAGE £

POSTCODE: TOTAL £

ACCESS/BARCLAYCARD NO:

In accordance with our competitive pricing structure prices are subject to alteration at any time.

# NEWS

**The latest information for Acorn micro owners**

## News in brief

ਗੁਰਮੁੱਖੀਸ਼ਬਦ ਗੁਰਮੁੱਖੀਸ਼ਬਦ ਗੁਰਮੁੱਖੀਸ਼ਬਦ

***

ਪੰਜਾਬੀ ਦੀ ਤਰੱਕੀ ਵਿੱਚ ਇੱਕ ਮਹਾਨ ਕਦਮ।

ਪੰਜਾਬੀ ਸ਼ਬਦ-ਰਚਨਾ ਇਲੈਕਟ੍ਰੌਨਿਕਸ ਨਾਲ
ਗੁਰਮੁੱਖੀਸ਼ਬਦ ਰਾਹੀਂ

'ਗੁਰਮੁੱਖੀਸ਼ਬਦ' ਦੁਨੀਆ ਵਿੱਚ ਆਪਣੀ ਕਿਸਮ ਦਾ ਸਭ ਤੋਂ ਪਹਿਲਾ ਪੰਜਾਬੀ ਸ਼ਬਦ-ਰਚਨਾ (ਕੰਪਿਊਟਰ ਰਾਹੀਂ) ਦਾ ਢੰਗ ਹੈ।

'ਗੁਰਮੁੱਖੀਸ਼ਬਦ' ਨਾਲ ਟਾਈਪ ਕੀਤੀ ਗਈ ਪੰਜਾਬੀ ਇਬਾਰਤ ਹੂਬਹੂ ਉਸੇ ਤਰ੍ਹਾਂ ਮਾਨੀਟਰ ਉੱਤੇ ਵਿਖਾਈ ਦਿੰਦੀ ਹੈ ਜਿਸ ਤਰ੍ਹਾਂ ਆਮ ਪੰਜਾਬੀ ਲਿੱਖੀ ਜਾਂਦੀ ਹੈ। ਪਰ ਟਾਈਪ ਸੈਟਿੰਗ ਮਸ਼ੀਨਾਂ ਵਿੱਚ ਇਹ ਸਭ ਤੋਂ ਵੱਡੀ ਘਾਟ ਹੈ। ਆਮ ਪੰਜਾਬੀ ਟਾਈਪਰਾਈਟਰ ਦੀ ਵੀ ਵਰਤੋਂ ਸਮੇਂ, ਜੋ ਕੁੱਝ ਅਸੀਂ ਟਾਈਪ ਕਰਦੇ ਹਾਂ, ਉਹ ਸਾਡੇ ਸਾਮ੍ਹਣੇ ਹੁੰਦਾ ਹੈ, ਕੇਵਲ ਕੰਪਿਊਟਰ ਦੀ ਤਰ੍ਹਾਂ ਅਸੀਂ ਉਸ ਵਿੱਚ ਆਸਾਨੀ ਨਾਲ ਵਾਧਾ-ਘਾਟਾ ਨਹੀਂ ਕਰ ਸਕਦੇ, ਅਰਥਾਤ ਸੰਪਾਦਨ ਅਸੰਭਵ ਹੈ।

● Wordprocessing in Punjabi before your very eyes. This was printed on an Epson. Details from Dr B Kandola, 25 Warrender Park Road, Edinburgh EH9 1HJ.

● Polaroid has finally released a BBC micro version of its Palette Computer Image Recorder which can produce colour or black and white slides, prints or overhead transparencies.

It uses a filter system and special film, and can work on a black and white monitor. The full pack costs £850 plus VAT, including camera and film. So all you need is to set it up and away you go.

● Electron RS232 ports and networking were featured in the Big Ben Club exhibition in Holland. Details from Jan Mars, Nieuwe Herengracht 255, 1011 SP Amsterdam, Holland.

Over 2000 people attended to see demonstrations of BBC micro and Electron products, attend lectures and swap software. See page 215 for the club's address.

● Ibbotsons' design software has been upgraded to exploit the B+128 and extra RAM. This sophisticated CAD software can now support RAM discs such as in the Opus Challenger, and battery-backed RAM such as the PMS 64k module. IDS, The Byre, Ecclesbourne Lane, Idridgehay DE4 4JB.

● *Play and Read* is a disc-based package to help children with reading problems. The pack includes audio cassette, disc software, books and workcards. It costs £25 plus VAT. Contact Prisma Software, PO Box 211, Chester CH1 3NJ.

# Acorn splashes out

Acorn has put its money where its mouth is with a major advertising campaign behind the BBC B+ and released a new version of the disc filing system to try to cope with the problem of disc software compatibility.

Advertisements have been running in the national and computer press, with large poster sites plugging the virtues and capabilities of the latest 128k BBC micro. The campaign is estimated to be worth £350,000.

Also, in a move to counter criticism from the public and major dealers such as Watford and Viglen, Acorn has released version 2.2 of the disc filing system for the 1770 disc controller chip in the B+. This has a Shift-Z Break function to get around disc protection based on the old 8271 chip.

Owners of the B+ should make sure they have version 2.2 or later. Try your dealer for an upgrade if you have problems running software, or call Acorn. The official line is that Acorn will swap if you cannot do a task with your present version.



**Part of the £350,000 campaign**

Acorn stresses however that most software is compatible and it is only disc programs with illegal protection methods that will not work. However, this covers many games on disc including, until the advent of DFS 2.2, Acornsoft's.

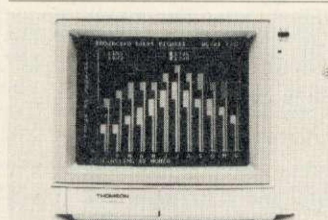
The company is compiling a list of B+ compatible software, but this concentrates on educational products, because virtually all of this will run because sophisticated protection methods are rarely employed. Few of the major games and business software houses are writing games to make use of the extra memory for the B+. However, Advanced Memory Systems has released Mouse software using shadow RAM and more utilities are starting to appear.

Major dealers have expressed concern that fears of incompatibility were stopping customers buying the B+, in some cases even preferring a second-hand model B. They believed that Acorn had not done enough to ensure compatibility and that customers still wanted the older model.

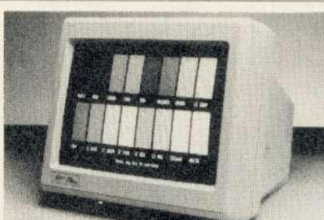
Nazir Jessa of Watford said he had even approached Acorn with the suggestion that they allow him to restart manufacture of the model B, but these talks foundered on the issue of price guarantees.

Vig Boyd of Viglen said that proper emulation of the 8271 was the only solution.

Whether Acorn's efforts satisfy the dealers remains to be seen.



**Thomson's CM31311S1 RGB monitor**


**Zenith's £98.95 amber screen model**

# Thomson aims at no.1 slot

France-based Thomson, one of the world's largest electronics groups, has burst onto the UK scene with a range of eight monitors with the BBC micro/Electron market firmly in its sights.

Cheapest is the 12in monochrome monitor with the snappy name of VM3102VG for £97.95. Top of the range is the 12in, high resolution CM31311S1 RGB model for £458.85. A medium resolution version costs slightly over £200.

Thomson aims to be number one in Britain within two years and sees Philips and Microvitec as the main targets. However, Zenith isn't leaving the way wide open, with two new monitors coming in at £89.95 for the green screen and £98.95 for amber.

Thomson on 01-631 3434, and Zenith on (0494) 448781.

# Second processor reads CP/M discs

A Z80 second processor for the BBC micro which will read 90 per cent of CP/M format discs is now available, claims Technomatic.

The device, called Multiform, enables data to be swapped between CP/M software running on various machines.

Text processed in *View* or *Wordwise* can be transferred to CP/M format and vice versa.

Multiform works with any drive configuration, and Acorn single and double density discs. Two formats can be run at the same time so data can be transferred between them.

Details of the £299 plus VAT Multiform from Technomatic on 01-208 1177.

## News in brief

● Electron and BBC micro owners can thrill to the thought of *Marvel* comic super heroes The Thing and The Torch whizzing around their micros in the £7.95 *Fantastic Four*, an adventure game featuring Dr Doom as the arch villain. No graphics though as there isn't enough memory, says Adventure International at 85 New Summer Street, Birmingham B19 3TE.

● Readers with a taste for the trivial have 2000 questions to face up to (with the option to create more) in *Powerplay: Game of the Gods* from Arcana Software Design. Players control warriors in 'a 3D courtyard battle'. The disc costs £14.95 from Avondale Workshops, Woodland Way, Kingswood, Bristol BS15 1QH.

● Intelligent Interfaces, developer of the IEEE interface for Acorn and specialist in control and data analysis software, has been appointed a dealer for 32016 second processors and the Cambridge Workstation. 43B Wood Street, Stratford-upon-Avon CV37 6JQ.

● Dev-Ice is a 6502/65C02 emulator which turns a BBC micro into a comprehensive development system, giving the engineer total control of the processor. It costs £485 plus VAT from Deva, Unit 2B, Pool Hall Industrial Estate, Ellesmere Port L66 1ST.

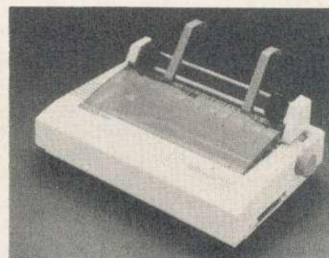
● The latest addition to catering software is *Menu Cost* from Shumwari Associates and complements *Menu Master*. The suites cost £220 each or £400 for the pair, plus VAT, from 12 Marlin Court, Marlow SL7 2AJ.

● Sideways ROM/RAM users can now do their editing with the *Floppy-Wise* utility chip for £30.95. This Tube-compatible software has 40 commands including a disc sector editor and memory monitors. From Software Services, 65 South Mossley Hill, Road, Allerton, Liverpool L19 9BG.

● *Acorn User*'s page number for you to download our software on Micronet is 60047565.







New printers for 1986. From left to right: Star NB-15,£950; Seikosha MP-1300 AI, £550.85; Citizen 120D, £270.25

# Printers on parade

Seikosha, Star and Citizen have each launched printers to kick off their 1986 sales campaign with a big bang!

The Seikosha MP-1300AI high speed multi-purpose printer with an optional plug-in colour unit, at 300 characters per second is one of the fastest printers around.

Near letter quality (NLQ) printing is handled at a more sedate 60 cps and it has a 30 lines per second (lps) paper feed which outputs in draft mode at 136 lines per minute.

The new clip-on/clip-off seven colour printing option costs £138.85, (inc VAT), and comprises a plug-in cartridge, a colour ribbon driving head and the colour ribbon carrier. It's quick to fit with the cartridge plugging into a hidden compartment.

The printer has Epson and IBM compatible modes; parallel and serial interfaces; 10k RAM buffer; and supports bit-image graphics.

It costs £550.85 (inc VAT). Details on (0990) 28921.

If fast true letter quality (LQ) print is what you are after, then for around £950 the NB-15 printer from Star will provide it at 100 cps. In pica draft mode a speed of 250 cps is obtained.

Interfaces include parallel and serial, and IBM compatible character sets are supplied.

A special feature of the NB-15 are character fonts on ROM cartridges which simply plug into the front of the printer.

High resolution bit-image graphics are possible and a 16k RAM buffer is present. Contact Star on 01-840 1800.

At the other end of the price range comes the £270.25 120D from Citizen, which offers a more leisurely 120 cps draft printing speed and 25 cps NLQ. Full Epson and IBM compatibility is assured.

Other features include bit-image graphics; 4k buffer; user replacable print head; variable width tractor feed and bottom and rear paper feed.

Contact Burson-Marsteller on 01-499 0414 for more details.

## Tape to Plus 3 transfer chip for the Electron

Two ROMs for the Electron are among the new releases from Slogger Software.

*T2P3* is a tape to Plus 3 transfer ROM, designed to move your tape-based programs from tape and save them to disc. Once on disc, programs can be loaded and run quickly.

*T2C3* is a similar ROM, but will transfer tape-bound BBC micro programs across to the Opus Challenger 3 RAM disc. From there they can be transferred to floppy disc.

For the Electron and Beeb is the *Stargraph* graphics extension ROM. Facilities are all accessed as * commands and include circle, ellipse and polygon drawing routines; colour fills; Epson compatible printer dump; and variable size and colour string printing routines.

Prices for these three ROMs, including VAT and package and postage, are: *T2P3* £19.95, *T2C3* £24.95 and *Stargraph* £21.95.

Further details are available from Slogger Software on (0634) 52303.




## Mini micro badges

An enthusiastic reader has produced hand-painted mini BBC micro badges made from resin. Peter Clements makes just 10 a week and they cost £7.50.

Contact Peter on (0322) 56577 evenings only.

## Twice as fast for £20

Double the speed of your BBC micro for £20 – that's the claim of Solidisk with its new 6502 microprocessor board which runs at 4MHz.

The board replaces the 6502 chip at the heart of the Beeb and runs at twice its speed.

It is based on the 65C02 chip which is newer and uses less power than the traditional version.

Solidisk (0702) 354674.

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(J. Noppen, Belgium)

## WATERLOO

The first new wargame from Lothlorien for a long time is great. You are Napoleon. Can you win at Waterloo and change the course of history? Your 6 Corps commanders are intelligent; they may use their own initiative, they may get confused. Can you use them to defeat Wellington? 3 skill levels. Full-screen graphics. 19 command keys and helpful victory hints in the manual. Your computer opponent depends, like you, on strength,, morale, terrain and a bit of luck. No Stick. (Lothlorien) **Cassette £9.95 Disk (40/80 Track OK) £12.95.**

## DR WHO

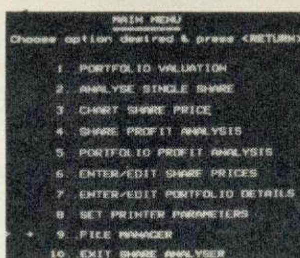
'Dr WHO and the mines of terror' comes from the authors of **'Castle Quest'.** There can't be a much better recommendation. It is three times as big as CQ and has 18K of graphics out of 40K of program, partly on ROM! The mines you explore measure 1000 feet wide to scale. There are interwoven mental puzzles and reactive tests. It's a real challenge. (MicroPower) NOT for BBC+ **Cassette plus ROM £18.95 Disk plus ROM £19.95**

## HARRIER

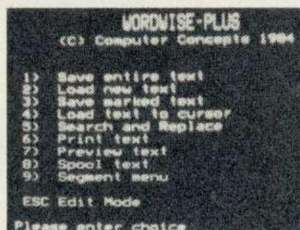
'Strike Force Harrier' is a full flight and battle simulation for a Vertical and Short Take-off and landing aircraft. Your objective is to bomb the enemy HQ while defending yourself and your ground sites from enemy aircraft and ground forces. Choose either Practice or Combat with 3 skill levels. 30 command keys. 5 on-screen windows. Flight chart to map your sorties. 28-page manual. Learn your different attack methods, from high-speed yoyo to the Immelman! No Stick. (Mirrorsoft) **Cassette £9.95 Disk (40/80 Track OK) £12.95**

## THE REAL YOU

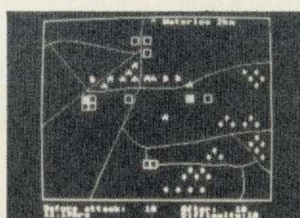
16 tests to try on yourself, your family, your friends. Are you a good lover? A latent radical? A good manager? Satisfied with your job? How do others rate you? Compare your sexual experience with the average. Measure your own IQ. How honest are you? Tests can also be taken by couples to measure compatability. Manual tells you how to change what you don't like about yourself. Fascinating. Sticks OK. (CollinsSoft) **Cassette 14.95 Disk(40/80 Track OK) £16.95**



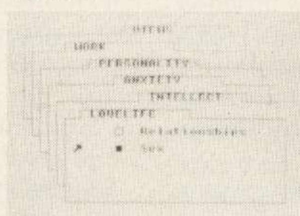

**Share Analyser**



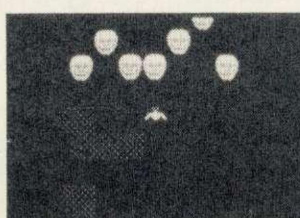

**Wordwise +**



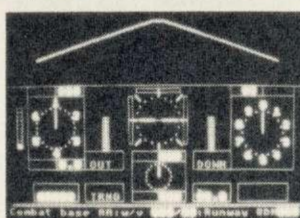
**Waterloo**



**The Real You**



**Repton 2**



**Strike Force Harrier**

## RED ARROWS

*"One of the best flight simulators to be released in a long time." (Home Computing Weekly) "Where it scores is in the relatively gentle introductory stages and the final aim of a performance of aerobatics. The graphics are very good ... highly recommended." (ZX Computing)* Written in co-operation with the actual pilots, this is a faithful simulation of the Red Arrows breathtaking aerobatics. Sticks OK. (Database) **Cassette £8.95 Disk (40/80 Track OK) £11.95**

## REPTON 2

*"This brilliant new game ... for my money the best arcade game for the Beeb ... Colour, sound, super scrolling, some excellent humour." (Acorn User)* That review was of the original Repton. Now there is Repton 2, which Acorn User says is *'even better than Repton.'* We agree. It even talks to you! It's bigger, more colourful, has more puzzles and better graphics and sound. You must collect over 1,000 diamonds and find the 42 jigsaw pieces strewn over 16 levels. Could keep you busy for months! Great fun. No Stick. (Superior) **Cassette £9.95 Disk (40/80 Track OK) £11.95**

## FLOPPYWISE+

*"Provides backup copies of protected disks quickly and simply ... I have yet to find a disk that it has not copied. I cannot stress strongly enough that to copy for any other purpose than personal backup is illegal." (Micro User)* This FloppyWise+ ROM contains 39 other very useful routines apart from the 'CLONE' routine reviewed above. An invaluable addition to your ROMS. (Software Services) **BBC ROM £29.95**

## ADRIAN MOLE

*"Looks really great. All the old characters are there ... even if you've read all the books and stuff, there are still plenty of new situations you can get into." (Your Computer)* Pete Austin, of Level 9 fame, has brought you the chance to be Adrian Mole in a split-screen text/graphics adventure which loads in 4 parts and will keep you amused for a very long time. No Sticks. (Level9/Mosaic) **Cassette 9.95 Disk (80 Track only) £12.95**

## INTER CHART/SHEET

*"Inter Chart is remarkably good value, capable of really serious work ... Inter Sheet is quicker, has more features and is cheaper than either of its competitors." (A&B Computing)* Two ROMS: a spreadsheet and a charting ROM. Buy them separately if you wish. But they also work together to swap data. Details are in our catalogue: but these ROMS are some of our most popular items and you save pounds on each of them! (Computer Concepts) **INTER CHART £33.00 INTER SHEET £50.00** (Recommended price over £93.00 the pair!)

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(A. Ammundsen, New Zealand)

## WORD PROCESSING

The most useful feature of any micro. For the Beeb, you can't beat the **WORDWISE+ ROM.** Compatible with 6502 2nd processor. Our price £50.00 saves you £6.35. The new **WORDEASE** Disk adds lots of useful commands to your Wordwise+, plus powerful label printing and mailmerge routines. Disk only (40/80 Track OK) £21.00. And, if you really use your Wordwise, you will need the **SPELLCHECK 2 ROM** from Beebugsoft. A dictionary disk with 6,000 words checks your spelling. Add to the disk (more than 17,000 words even on a 100K disk!) as you wish. 6502 compatible. As A&B Computing said it's *"the obvious choice"* Our price £32.00 saves you £2.00.

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## News in brief

● Educational software is not commercially viable under the present distribution system, claims Leslie Gilbert in a survey, *The Distribution of Microcomputer Software to Education*, by the Council for Educational Technology. Gilbert, former assistant director of CET, says 50 times as much is spent on hardware as software. The survey costs £7.50.

● More and more software houses are turning to the Electron and producing dedicated versions of their games. The latest is Robico which has put its *Rick Hanson* adventure game into mode 4 and squashed the screen down to cram in 220 locations and an advanced interpreter at £9.95.

● Four new tracks have been released for *Revs* – Brands Hatch, Donington Park, Oulton Park and Snetterton. The cassette costs £9.95 with the disc £3 extra. *Revs* follows *Elite* in being licensed to Firebird for other micros.

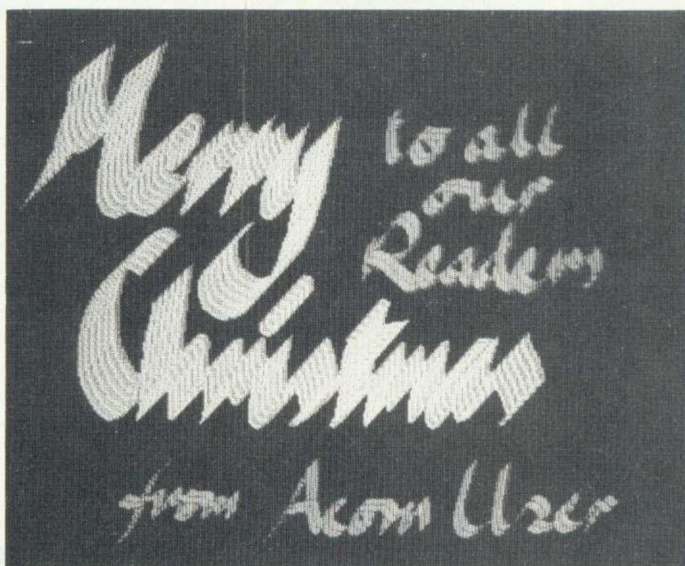
● Simulate the hazards of driving a motorbike on the BBC micro with *Star Rider*.

It costs £12.50 on disc and is part of a range of road safety software from the British Institute of Traffic Education Research, Kent Street, Birmingham B5 6QF.

● Radio ham software from CTP includes *Amprom*, a chip for controlling the sending and receiving of data. It can also copy files across a radio link with error correction, the EPROM costs £18 and the tape £8. Contact Russell Whitworth, G4CTP, 107A Shacklewell Lane, London E8 2EB.

● Theft of a box of discs from our stand at the Christmas Show in London's Central Hall has caused problems in the *Acorn User* office. We would appreciate their return, in which case no more will be said.

● BBC Soft claims its machine code monitor will help programmers develop software 'with the greatest of ease'. The *Monitor* chip is compatible with the Tube, Econet, ADFS and RAM boards and costs £39.95.




## AU Xmas greetings

We hope you all appreciate the *Acorn User* Christmas card (above) which is included as an extra on this month's listings cassette and disc (see page 103 for details of how to order them).

It was done by our astounding graphics programmer Malcolm Banthorpe and when you run it, the letters are actually drawn on the screen before your very eyes! It has to be seen to be believed.

Unfortunately, the data files used to produce it were too long to print, but it can be adapted so you can give personalised discs to your friends.

This is easily done by listing the program and changing lines 40 and 50 to PRINT statements. For example:

```
40 PRINT "Dear Mum"
50 PRINT "From Tony"
```

These messages won't be printed in fancy lettering, but in normal mode 1 text.

## Unearthly sounds from Maestro

Tunes from *Ghostbusters*, *Chariots of Fire* and Madonna feature on a range of four music tuition cassettes under the label *Micro Maestro*. Titles cover keyboards, recorders, concert pitch and B-flat instruments. Each pack has an audio and program cassette and costs £14.99 for the BBC micro and Electron.

Details from Mupados Ltd, Unit 11, Tregaron Road, Lampeter, Dyfed SA48 8LT.

## Mouse make-up

AMX has upgraded its Mouse package to work with extra memory systems such as shadow RAM and second processors. A new chip, at £49.95, combines the original ROM plus the art program to give colour displays. This can be used from keyboard or joystick. The Mouse costs £40.

Four other new packages are a page make-up system, database, multiple choice exam paper creator and 3D graphics display for data. Prices £14.95 to £49.95.

## Prisma 2's 4096-colour palette from Millipede

Put a fancy Hitachi graphics chip with 1Mb of RAM on the back of a BBC micro and you get a high-resolution graphics unit with a 832×576 pixel display and 16 colours available from a palette of 4096.

The Prisma 2 is the fancy box in question and it costs £2195. It is available from Millipede, 12 Pryor Close, Cambridge CB4 4BU.




## Teach-in on telephones for schools

Telephones, English and French are some of the subjects of recent educational software releases.

*Phonin* was originally developed to teach children in special schools how to use a phone, but is also suitable for infants and juniors. The disc for B/B+ micros costs £38.50 from Primary Programs in Saffron Walden.

*Entertaining English* and *Adventurous English* are arcade and adventure style games to improve language skills. BBC micro and Electron cassettes cost £7.95 and £9.95 respectively with discs also available for the Beeb. The range is carried by BESA stockists.

*Le Vocab* and *La Conjugasion* from Edstat of Nottingham cover French vocabulary and verbs. German and Spanish versions will follow. BBC micro discs cost £13.95 each.

If you have trouble finding software or publishers, refer to our May education issue for a six-page listing. Also the British Council has compiled a catalogue of educational publishers, available from 65 Davies Street, London W1Y 2AA.

The British Educational Software Association (BESA) has dealers spread around the country. Contact Martin Neild at MacMillan Software on 01-836 6633, or Barbara Warren at Calpac on (04876) 2584.



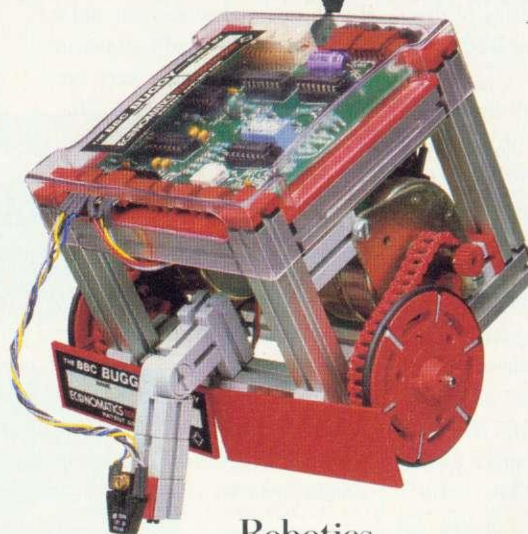
El

# BBC exten

Control

Vision Systems




Robotics



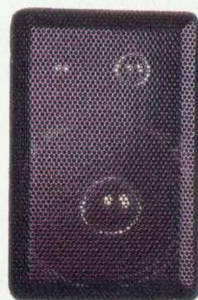
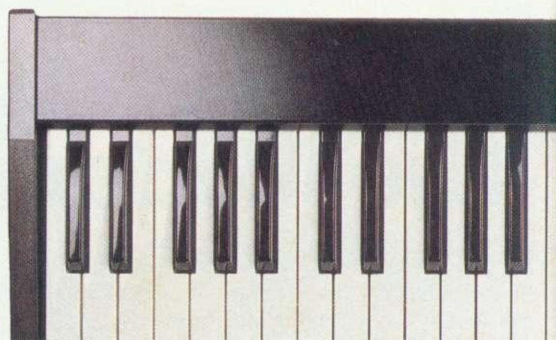

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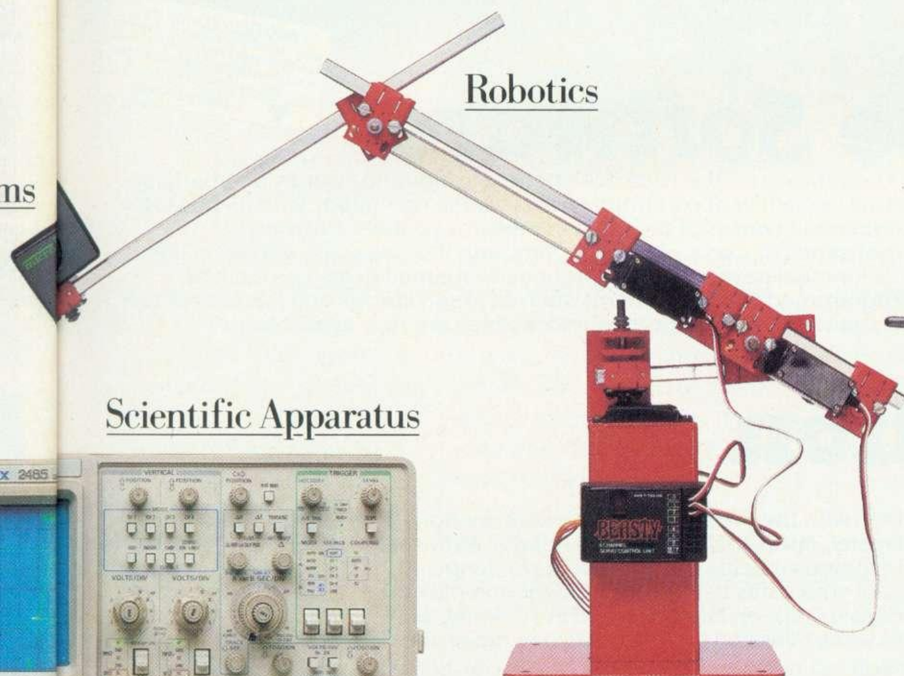
Electronic Communications

Music

# nal services.



Computer Aided Design

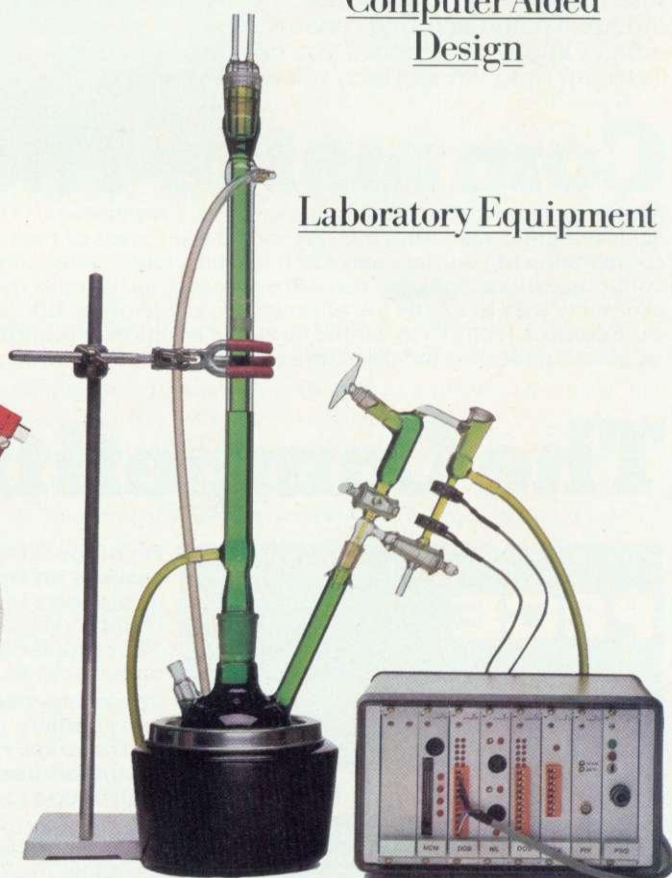


Robotics

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No wonder the BBC Micro has already been chosen by 75% of schools. It's the one micro you and your children will never outgrow.

# Nightingale
## *The Modem*




The facts speak for themselves, **Nightingale** is without equal in its field. It is undoubtedly the most popular multi baud rate modem available today. Whatever your communication requirements, the simplicity of use and the versatility of **Nightingale** will enable you to provide a solution whether the need is to extract information from Prestel, send telex's via Telecom Gold, download telesoftware or exchange files, **Nightingale** will do the job and a whole lot more besides.

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**Nightingale** has passed the very rigorous tests required by the BABT and is fully approved for use in the UK. This not only means that you can rely upon the safety of the product because of the stringent manufacturing constraints, but also means that because it is a BABT approved product, you can be assured that your application to Telecom Gold, Prestel etc., will not be refused.

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.
S/2592/3/E/500065

# Commstar *The Software*

A fitting partner for the Nightingale modem, **Commstar** was nominated for the 1985 British Microcomputing awards, a remarkable achievement considering the very recent awareness of the true versatility of communications via the computer. With its powerful combination of Viewdata and ASCII terminal capabilities contained in one 8K Eprom, **Commstar** is probably the only communications Software you will ever need, as its many thousands of users will testify. Although it is unusually versatile, it is extremely easy to use as full advantage is made of the BBC's function keys and a comprehensive manual describes each of **Commstar's** features in simple terms. In addition to preprogrammed functions, items such as logon strings and passwords can be placed under the function keys to facilitate automatic access to the vast range of services which are now available.

# The Competition




Pace have linked with the premier computer information provider on Prestel, MICRONET and Virgin Atlantic Airlines, all pioneers in their own fields, to offer you a challenge. A chance to try out your skills using your modem and play the 'Pace round Britain Quiz' on Micronet, and in so doing, an opportunity to win a fabulous holiday for two in New York.

This competition will be open to you between November 1st and February 1st if you buy one of our modems before the end of January. In addition, you will be given, free of charge, a full quarters subscription to MICRONET worth £10, and free registration to Microlink on Telecom Gold.

The prize includes a return flight to New York, 6 nights accommodation in a high quality New York Hotel, and spending money to the total value of £400.

Full details are contained with each modem.

micronet 800

Virgin atlantic

**Nightingale Modem £119 plus VAT; Commstar Software £29.57 plus VAT; combination package £139 plus VAT**

PACE

The products and information are available from good quality dealers throughout the country or direct from Pace. Payment accepted by cheque, Access or Visa.




**Pace Micro Technology Ltd.,**
**Juniper View, Allerton Road, Bradford BD15 7AG.**
**Tel. 0274 488211 Telex 51564**
**Telecom Gold mailbox No. PCE 001 Prestel Mailbox No. 274729306**

# Going on air with the Micro Live team

*by Geoff Nairn*

Making a live television programme requires the patience of a saint, gallons of coffee and adrenalin, and a deep distrust of anything mechanical, as I discovered when I visited the *Micro Live* studio.

The first series of monthly *Micro Live* programmes, broadcast in 1984/85, was so successful that the new series was promoted to weekly, allowing more topicality.

The team of presenters reflects the diversity of areas covered in the series: Ian McNaught-Davis is a veteran of *Making the Most of the Micro* and other BBC Computer Literacy programmes; Fred Harris, formerly a children's TV presenter, is now a dab hand at handling the hardware; and Lesley Judd, an ex-*Blue Peter* presenter, plays the computer-naive sidekick to the other two, while Freff is the show's US correspondent.

In addition, various experts and computer hacks are dragged into the studio as and when necessary.

Studio TC2 at the BBC Television Centre in West London is not one of the Beeb's largest studios; indeed when filled with the different sets, 20 odd people, four hefty cameras, a dozen computers plus the spaghetti of connecting cables, it looks decidedly cramped.

However the studio has nothing on the gallery, a darkened room high above the studio, lit only by banks of monitors and twinkling lights on mixing consoles. Here sits the director, Patrick Titley, and a team who press buttons, push sliders and mix together the various inputs – live action, video tape recordings (VTRs), filmed outside broadcasts or 'tele-cines' (TKs), plus captions and graphics – into a single coherent TV programme.

Among all the specialised equipment in the console is a Quantel electronic manipulator which costs many thousands of pounds, responsible for those flashy effects where one picture shrinks into the corner of the TV screen and another grows out of the opposite corner. There's also an Aston caption generator for creating short pieces of text, which can be called up as the programme is being transmitted and superimposed on the picture.



**Micro Live presenters Ian McNaught-Davis, Lesley Judd and Fred Harris**

Lodged in between all this expensive equipment there sits a humble BBC micro used for producing the closing titles, in the distinctive Beeb character font, which scroll up the screen.

The day starts for the *Micro Live* team nine hours before transmission time at 10.30am with the first rehearsal for the show. The running order of items is already decided and around a third of the show has already been recorded, either on film or video tape, but there are still voice-overs, graphics and sound to be added, and the remaining live items have to be rehearsed several times. Mechanical graphics – for example, a picture of the USA to illustrate the story on the US computer industry – are pre-recorded as still frames and stored in a 'slide file' to be called up during transmission.

Some of the mechanical graphics are transmitted live, with a TV camera focused on a piece of card bearing the illustration.

Three BBC micros featured in a live studio demonstration of speech synthesisers, using different systems, including the Acorn speech chip and a Cumana system. Video output from the Beebs can be fed directly to the mixing desk, and so their signals can be treated just like those from the studio cameras. Acorn would probably wince at the operating conditions – the machines are left on all day under hot studio lights – but apparently they are very reliable.

At 5.15pm there's a complete run through, and during this the computer graphics for a news item on Acorn start causing problems; although all right on the computer screen which generated them, by the time they've been through the mixing desk and appear on the transmission screen, they've developed a nasty 'strobing' – flickering on the close parallel lines used for shading the bar-charts. They are improved but the director decides not to use them.

A final dress run at 6.45pm goes smoothly and at 7.15pm, 15 minutes before transmission time, sound and vision are lined up ready to go 'network'. The red 'transmission' light floods the gallery and down on the studio floor tension rises as the studio lights are raised to full brightness. Fred Harris pleads with the BBC micros to behave and at 7.30pm *Micro Live* goes on the air.




Robots are definitely the thing, though quite what you're supposed to do with them is never explained. As well as the loony pet cat which remorselessly tracks you down wherever you are, there's now a whole family of them with the unfortunate suffix of 'bot' – Omnibot, Hootbot, etc.

I leave your imagination to do what it will, but I feel duty bound to point out that Hootbot is a kind of owl, complete with talons!

This reduced instruction set computer (RISC) of Acorn's seems more like a 'good idea'. Three million instructions per second is fairly bombing on, and wipes the floor with just about everything else on the market with the possible exception of the Transputer from Inmos. Cheeringly, it was developed on a BBC micro with 6502 second processor, and all tests were simulations on the Beeb.

The first actual chip was the finished article and it worked straight off. Question is, when will we see it in a finished machine? There is at least a prototype in existence, so we live in hope.

Just as interesting will be Olivetti's reaction, considering that it makes their machines look just as sick as the rest.

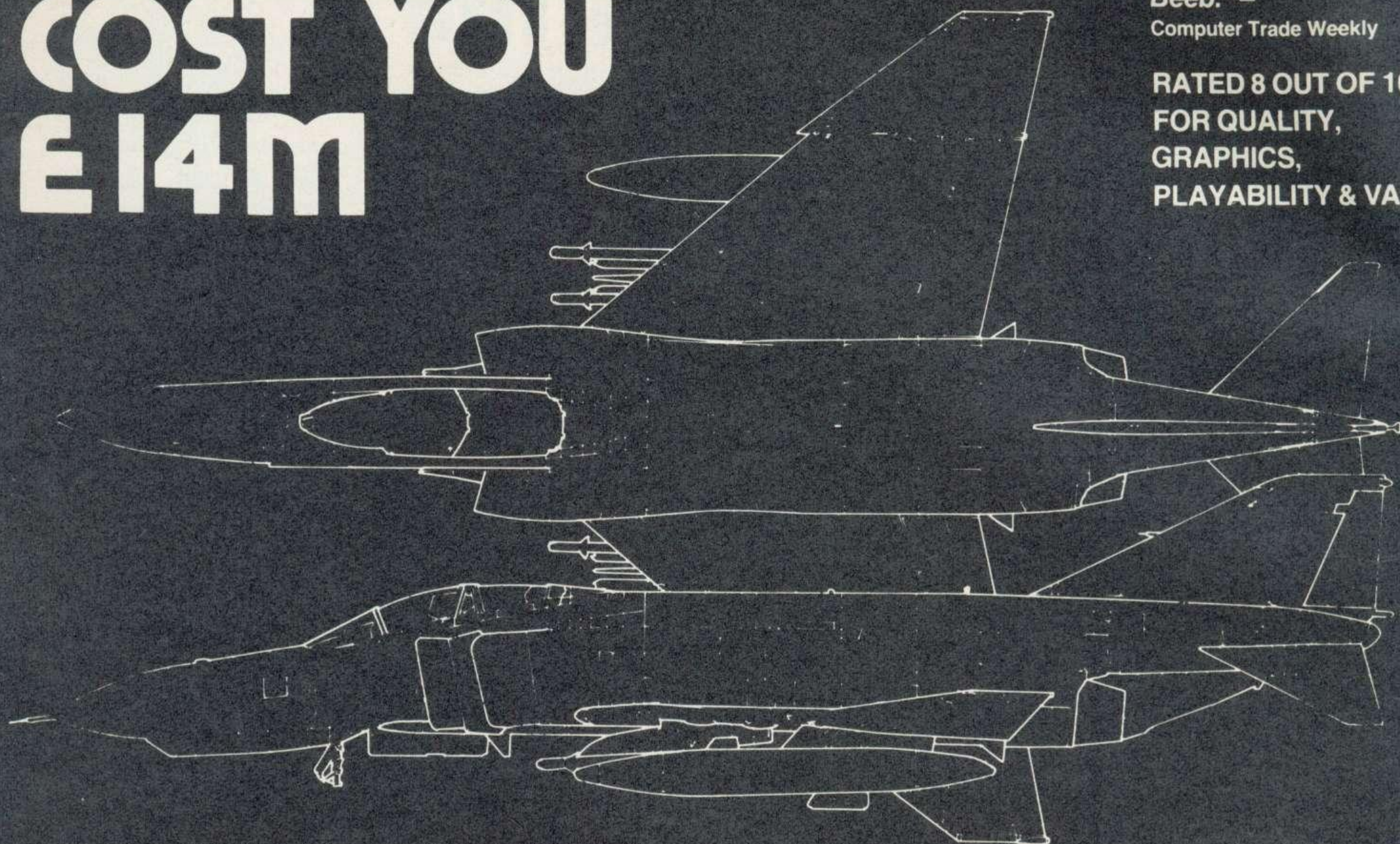
One cloud is that 'IBM compatibility' is the boring standard of today's business micros, despite the fact that IBM PCs are crummy performers and have been underpowered right from the start.

It's funny how these things take hold. Until recently, the primitive and barely comprehensible CP/M operating system ruled – now it's PCDOS from IBM. I suppose any new Acorn/Olivetti machine could fall in with the look-alike brigade. It's almost inevitable, but I hope not.

# A COMBAT READY PHANTOM II WILL COST YOU £14M

*"Well produced and technically good futuristic combat flight simulation featuring some of the best and smoothest 3D graphics I've come across on the Beeb."* –
Computer Trade Weekly

**RATED 8 OUT OF 10 FOR QUALITY, GRAPHICS, PLAYABILITY & VALU**



More than 'just' a very fast full-flight Simulator 'Phantom Combat' offers the excitement and energy of 1500 mph air to air combat in high resolution 3D colour graphics. This 100% machine code package has been written by a military flight simulator software engineer together with the B.A. captain who wrote the best selling '747' simulator for Doctor Soft.

## A SIMULATOR INSIDE A SIMULATOR

In one of the training modes (formation mode: FORM) it is **actually possible to fly the Phanton AND control the Enemy aircraft** which can be clearly seen flying in 3D outside your fully equipped cockpit. Alternatively, a friend can pilot the target (on separate keys) while you attack.

## THE ADVERSARY

Now, at last, enemy aircraft are NOT shown as arcade 'sprites', **they are computer drawn, navigated and 'flown' at a smooth 15 Frames per second**. The delta outlines reflect Soviet Mig 21 (Fishbed) 9Su 15 (Flagon) performance. In combat mode (CBAT) they fight back, intelligent and dangerous.

## INSIDE

Instrumentation is comprehensive with a wealth of clear and precise displays, **featuring both analogue and digital readouts**, eg speed in knots as shown on a dial AND digitally, with a separate Mach number display; radar computed target range altitude and bearing shown; target pointer and gunsight; military 'Tacan' navigation (Tactical air navigation) etc.

## 'OUTSIDE'

External views includes Horizon, other aircraft, a network of ground detail points; **separate landing runways and animated 'strobe' approach lighting**. NO 'chunky' pixels, all objects are drawn in fine, high resolution coloured lines. **The view is recomputed and redrawn 15 times every second.**

## AIR TO AIR COMBAT

Warning There are no 'lives' but your single one, your score is zeroed and the program restarted if you are shot down or crash. This motivates you to try and 'bring home' a damaged aircraft. May different forms of damage can occur. Most are survivable, eg a gear up runway landing if smooth enough. **If you can't land, use the EJECTION seat and survive.**

# THE BEST ALTERNATIVE?.. £9.95

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Address ..................................................

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.................................................. AU1

**BBC 32K**
**ELECTRON versions**

# HELP US TO HELP YOU

The *Acorn User* Reader Services offer which we kicked off in October has proved a huge success – so much so that we have been inundated with enquiries. This article is to help us help you so that we can give you a better answer and even more value for your money. However, we have had to increase the reply time to 10 working days because of contacting hardware suppliers, etc.

*Acorn User* strongly recommends readers who are new to home computing, and even the old hands, to join their local computer club – you will probably find answers to many of your questions there. Your library should have details of your local club.

The enquiries we are getting fall into three main categories: hardware, software and add-ons.

Dealing with hardware problems is difficult, in fact without the necessary test equipment it is often impossible to give an answer. We can suggest tests but it is likely that we will recommend that you take your micro to an Acorn approved dealer who has the correct equipment to perform hardware diagnostics, and can actually lay hands on the equipment.

Software is more straightforward, but we need to try it for ourselves, so send in a disc and any listings, etc. Please give as much information about your program as possible by writing comments next to the listing or on a separate sheet of paper.

Finally add-ons. Problems are often uncomplicated, but once again we must have details of all your kit.

Many enquiries come in containing up to 10 questions, but £2 does not go far and a single problem can take 30 minutes to solve. Of course you are free to ask as many questions as you wish, but you must send £2 per question otherwise only the first one will be answered.

When you write to Reader Services please provide as much information as possible, clearly and concisely.

First, print a list of all your equipment. This example shows a typical information sheet:

| | |
|---|---|
| Name: | Orson Fact |
| Address: | Sleuth Cottages<br>Detective Drive<br>Hidden<br>Sherlockshire |
| Telephone: | (0999) 1234 (home)<br>(0999) 1212 (work) |
| Equipment: | BBC B+ 128<br>OS 1.2<br>Watford DFS 1.4<br>ADFS<br>Network |
| Internal extras: | Solidisk modem<br>Watford ROM Board |
| ROMs: | Graphics Extension 1.2<br>Basic Editor 1.2<br>View 3.0<br>Disc Doctor<br>Novocad |
| Peripherals: | 10 Mb Winchester Hard Disc<br>Colour Monitor<br>Technomatic Dual 80/40 Drives<br>Star SD10 Printer<br>6502 2nd processor |
| Other details: | Issue 10 board, 2 months old<br>Other equipment, 18 months old but previously used okay on BBC B.<br>Purchased at Bloggs Computers, London. |

Such a list makes it possible for us to see at a glance just what you have. It's surprising how many readers don't give any details about their set-up.

The next thing we need to know are the details of your problems. Use a separate sheet of paper and print the details neatly, noting points such as: the problem itself, how long it has been happening, what started it off (if known), any remedies you have tried, any other information.

In the case of software, a disc (preferably) or tape *must* be included. If it is your own program, then a commented listing or well REMed program is essential.

With this information we can attempt to answer your enquiry quickly and efficiently and give you the speedy answer you want. Please allow at least 10 *working* days for your answer. Unfortunately we are unable to answer enquiries over the phone.

# POST A PROBLEM

AS a result of pressure from readers, *Acorn User* now guarantees a fast reply service for enquiries. Your answer will be returned within 10 working days for just £2 (includes VAT), or your money back.

The idea is simple. Just write out your problem, fill in the coupon (right), and send both off to *Acorn User* with a stamped addressed envelope and cheque or postal order for £2. (If you want recorded delivery, add the cost of this on. The same goes for overseas readers.) Include as much detail as possible and a disc or cassette if a program is involved – with enough space to record any corrected listing.

We will then answer the problem and return all material received – within a guaranteed *10 working days* from receipt. If we fail to match this promise your cheque or postal order will be returned with the answered question. If we cannot answer the problem, the cheque will be sent back to you.

If you want a listing debugged, advice on hardware or software, or a list of addresses, send us your problems.

ACORN USER READER SERVICE
68 Long Acre, London WC2E 9JH

Name ..........................................................................

Address ......................................................................

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.................................... Postcode ....................................

Daytime phone number.................................................

I enclose a cheque/postal order for £2 and an sae with my problem.

OFFICE USE ONLY Date in:
Date out:
Answered by:

# NOTICE BOARD

## ON TELEVISION

*Planets* on Channel Four uses computer graphics to create a solar system and simulate travelling through space.

The seven-part series goes out on Saturdays at 7.30 pm.

*Micro Live* on BBC2 has a Christmas special on 13 December, featuring a report from the US on computers and fractal geometry, plus a guide to suitable presents for micro enthusiasts.

*Micro Live* goes out on Fridays on BBC2 at 7.30 pm.

## ON RADIO

*Inside Information*, Radio 4 VHF, Sundays 4.30 pm. A series of 10 weekly broadcasts which form part of a self-learning package about information technology. An audio tape of edited radio programmes is also available. Further details from BBC Publications at the address below.

## TO CONTACT

Acorn (0223) 245200.

Acorn's own bulletin board service is Prestel-compatible (1200/75) and runs on (0223) 243642.

*Acorn User's* page number on Micronet is 60047565. You can download *AU* software.

BBC TV's *Micro Live* bulletin board is on 01-579 2288 (type INFO BBC on Telecom Gold electronic mail system).

BBC Publications has launched a public viewdata service, Owltel on, 01-927 5820. It offers information on the BBC computer literacy project and its software and computer books. Credit card orders can be made on-line. Write to: BBC Publications, 35 Marylebone High Street, London W1A 4AA.

BBC Computer Literacy Project, Broadcasting Support Services, PO Box 7, London W3 6XJ. Please send sae.

Bulletin Boards: CABB 01-631 3076; CBBS London 01-399 2136; Distel 01-679 1888; Forum 80 Hull (0482) 859169; Forum 80 London 01-399 2136; Grendel (0532) 620334 (9pm to 8am); HAM-NET (0482) 497150; Liverpool Mailbox 051-428 8924; Mailbox 80 (0384) 635336; Technomatic 01-452 1500; TBBS London 01-348 9400; TBBS Nottingham (0602) 289783; TBBS Southampton (0703) 437200.

British Telecom's Home Computer Line offers as short bulletin of hardware, software and general news. At present it's only available in Bradford, (0272) 722622, and Belfast, (0232) 8085.

MEP (Microelectronics Education Programme), Cheviot House, Coach Lane Campus, Newcastle-upon-Tyne NE7 7XA. Hardware and software support for schools. Please send sae.

MAPE (Micros and Primary Education), c/o Barry Holmes, Saint Helen's Primary School, Bluntisham, Cambs. User group for primary teachers. Send sae.

MUSE (Micro Users in Schools and Education), Freepost, Bromsgrove, Worcs B62 7BR. User group for teachers and parents. Please send sae.

National Extension College, 18 Brooklands Avenue, Cambridge CB2 2HN. Educational and training courses on the BBC micro. Please send sae.

CET (Council for Education Technology), 3 Devonshire Street, London W1N 2BA. Government body which overseas MEP. Please send sae.

## ON SHOW

Learning with Computers is an exhibition of software, books and periodicals forming part of the British Council's programme for software promotion which will tour Europe, India and the Gulf during 1986. Dates confirmed so far are January 13-16 Middle East Bookfair, Bahrain and February 5-17 World Bookfair, Delhi.

14-17 January 1986, Which Computer? Show, National Exhibition Centre, Birmingham. Details on 01-891 5051.

22-25 January, High Technology and Computers in Education Exhibition, Barbican, London. 01-349 4667.

## FOR HELP

Collect two vouchers from Twinings tea bag boxes and you can get 30 per cent off these Acornsoft titles. All prices are for cassette versions and include post and packing.

For the BBC micro: *Elite* (£10.46), *Podd* (£4.89), *Tetrapod* (£6.96), *Watch your Weight* (£8.33), *Crazy Tracer, Meteor Mission, Picture Maker, Go, Gateway to Koros, Paul Daniels Magic Show* (all £6.96 each).

For the Electron: *Elite* (£9.06), *Podd, Snapper, Watch your Weight, Crazy Tracer, Firebug, Picture Maker, Go, Sphinx Adventure, Paul Daniels Magic Show* (all £4.89 each).

To contact *Acorn User* authors, write c/o the editorial address given on page 2.

Remember you have until May 11 to register with the Data Protection Registrar if you are a business micro user who processes information about individuals. It costs £22 and failure to register is a criminal offence under the Data Protection Act, 1984.

Contact the Data Protection Registrar, Springfield House, Water Lane, Wilmslow, Cheshire SK9 5AX for advice and details.

## BLUNDERBOX

The C Itoh phone number is 01-946 4960, not as printed in the November issue.

Here's a quick round-up of the blunders in our programs since August.

Martin Phillips has cured bugs in *Easyplot*. Insert the following line in PLOT 2 to stop the program ending if the wrong mode is entered:

50 ON ERROR MODE 4: PROCm

When using the character definer, two characters can become corrupted by the double height routine. This can be overcome by changing each occurrence of the value 240 to 158, and of the value 241 to 159. The following lines will need changing. In the August issue (pages 106 and 107):

PLOT: lines 1670, 1700, 1710

PLOT 2: line 490

On page 103, September issue:

RUNPLOT: line 20100

Also in the August issue in PLOT 2 line 190 should contain a space in between the 'G' and the 'TO' in the phrase 'ELSE-FORI=GTOI' to avoid a 'no such variable' error. Also a '£' was printed instead of a '#' in the following lines: 160, 170, 180, 410, 420, 1190.

In Peter Higginbotham's Beeb Forum article in September, the reference to address C800 three-quarters of the way down the second column on page 117, should be B800.

In the program, lines 480 and 620 have an LDA instruction where there should be LDX. This instruction generates a non-existent OSBYTE call (A=&30) instead of the intended one to change the SHEILA paged ROM select register (OSBYTE A=&97, X=&30). It seems that this call is not actually necessary in the context of the program – the previous OSWORD call to write the ROM number to &F4 in page zero of the I/O processor is sufficient. However, for use as a general purpose routine, the LDX should be corrected.

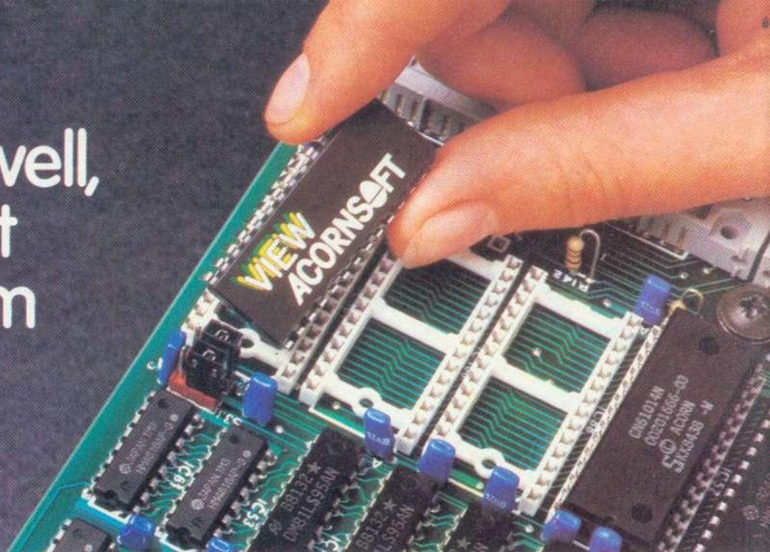
A few bugs crept into Martin Phillips' three short listings on page 83 of the September issue. The correct versions of the lines involved are:

```
  240 B%=1:1%=0:h%=0:ang=0
:PRINT"Enter dimensions Y/
N ":PROCg:IFA$="N"GOTO244
ELSEINPUT"Enter length or
press return "1%:INPUT"Ent
er height or press return
"h%:IF1%*h%=0:INPUT"Enter
angle "ang:ang=0.0001+RADa
ng
  244 PROCe:PROCp:REPEAT:P
ROCa:IF1%+h%>0 x%=X%+1%:y%
=Y%+h%
  252 PROCe:PROCp:REPEAT:P
ROCa:IFh%*1%>0:x%=X%+1%:y%
=Y%+h%
  262 ang=RAD(ang):PROCe:P
ROCp:PROCf(x%,y%):REPEAT:P
ROCa:IFc%>0:PROCf(x%,y%):x
%=X%+c%*COSang:y%=Y%+c%*SI
Nang:PROCf(x%,y%)
```

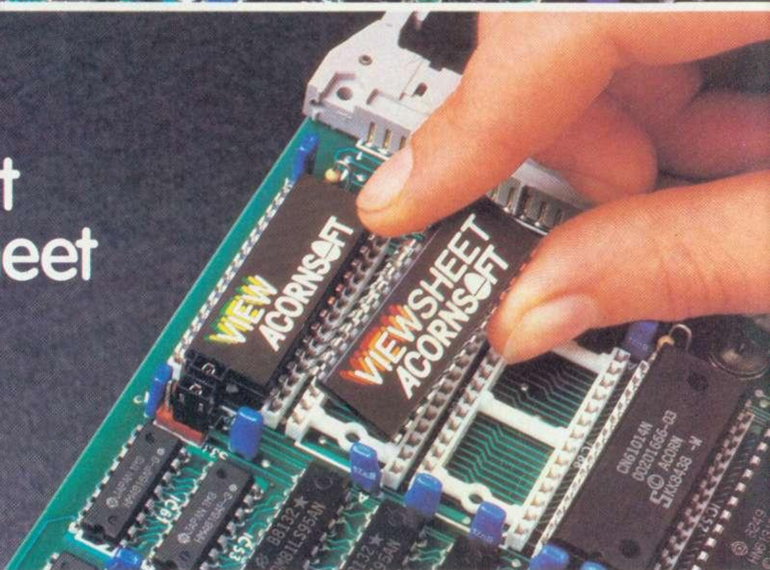
To adapt Chris Steele's *Freehand* program to work on the Electron see November page 111.

The diagrams in October's Atom Forum contained a few errors. If readers would like to write or telephone us we would be happy to supply a copy of the corrected circuit diagram.

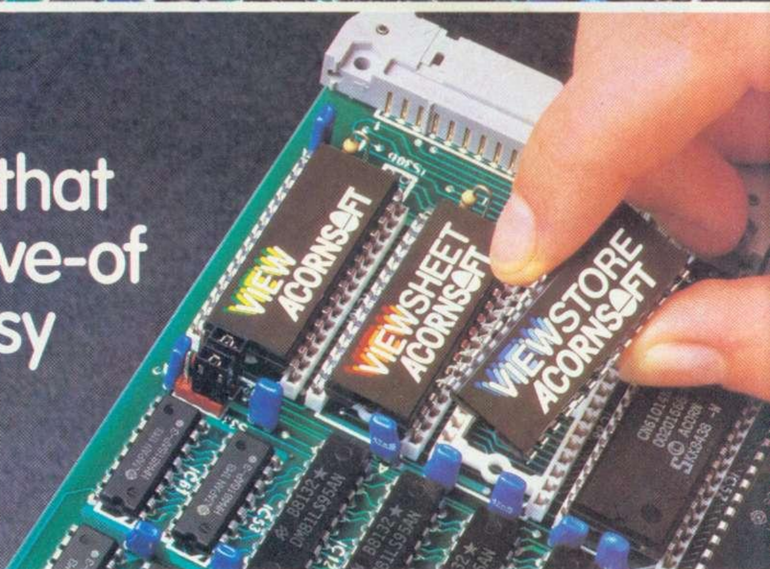
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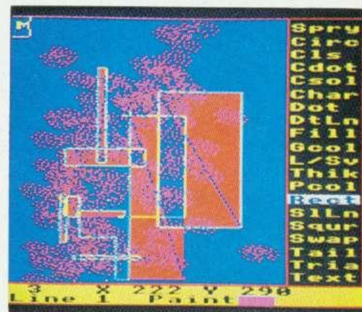
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# TOUCH PAD SCREEN ARTIST

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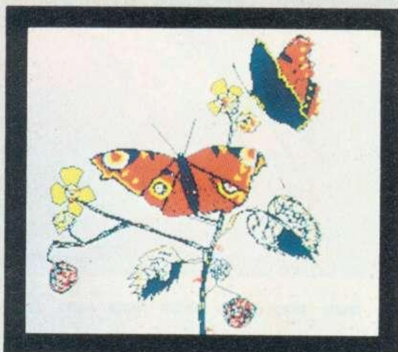




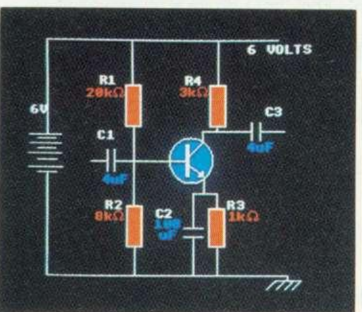

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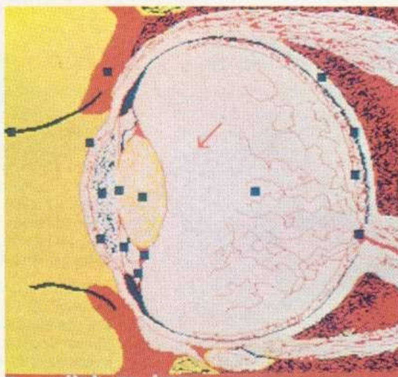
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Move the PEN UP and DOWN on the PAD then press any button to select.
Prepare a NEW test
Enter pupils names
See pupils reports
Edit
Printer Routine
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- Enter Pupils Names
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- Edit
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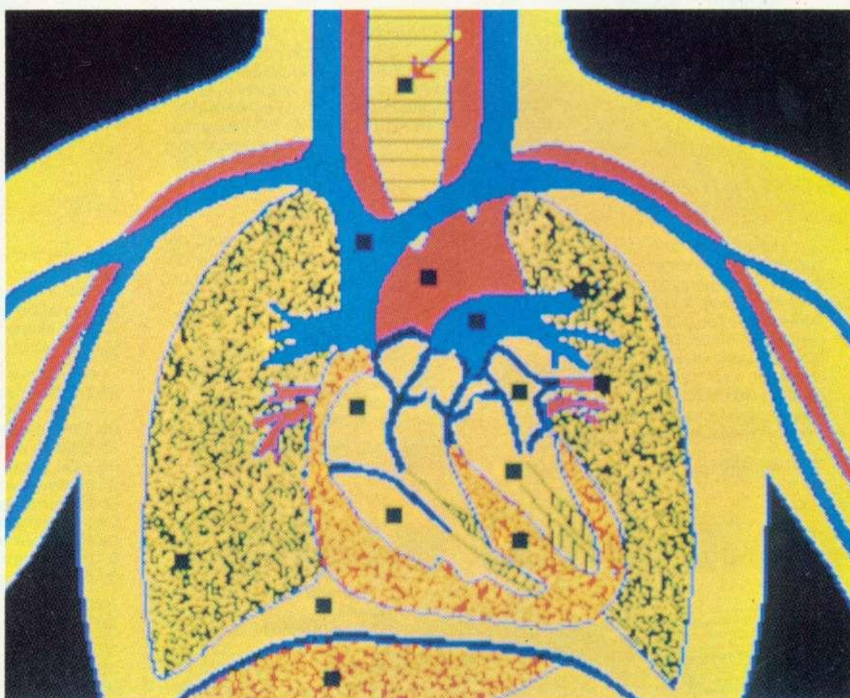
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| BBC Mod B Plus with DFS and Econet | £465.00 |
| BBC Mod B Plus – 64K with 64K Upgrade Kit | £449.00 |
| BBC Mod B Plus – 128K | £449.00 |

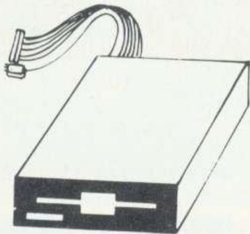
## DISC DRIVES

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| CSX 100 (100K) 1 x 40 Track Single Sided Drive Excluding PSU | £95.00 |
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| CDX 800S (800K) 2 x 80 Track Double Sided Drive Excl. PSU | £185.00 |
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| Canon PW 1080A (NLQ) | £269.00 |
| Canon PW 1156A | £379.00 |
| Star SG 10 | £249.00 |
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| MP 165 | £240.00 |
| Juki 5100 | £269.00 |

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| Juki 6100 | £319.00 |
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| Juki 6300 | £799.00 |

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|---|---|
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| Microvitec 2030 CS20 Std Res | £435.00 |
| Microvitec 1431AP Std Res | £228.75 |
| Microvitec 1451 AP Med Res | £320.00 |
| Kaga RGB Vision II12" High Res | £258.00 |
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The RA20+44 board has 20K of RAM addressed from &3000 to &7FFF when switched on with *VIDEO. This will in effect give you back 20K of RAM if you are using say MODE O. There is also 2 slots of sideways RAM from &8000 to &BFFF which can be used for ROM based software. There is a further 12K of RAM from &8000 to &AFFF which can not be used as sideways RAM. This is the situation in the BBC+ and it means in effect that this board will turn your BBC into a BBC+ as far as the VIDEO and the extra 12K RAM is concerned. One can read and write to this 12K RAM in the same way as the BBC+ does. We offer this RAM as a printer buffer.

| | |
|---|---|
| RA20+44 | £79.00 |
| Write protect kit | £5.00 |

**RAMAMP RA32N**
The RAM/ROM board has 6 slots of ROM and 2*16K of sideways RAM that is addressed from &8000 to &BFFF. THIS EXTRA RAM IS NOT AN EXTENSION OF MEMORY FOR BASIC.

| | |
|---|---|
| RA32N | £59.00 |
| WPK/N | £5.00 |

**RAMAMP RAM16**
The 16K RAM BOARD (RAM16) is a sideways RAM board which plugs into any spare ROM slot. It is addressed from &8000 to &BFFF. THIS EXTRA RAM IS NOT AN EXTENSION OF MEMORY FOR BASIC. A write protect switch can be fitted. Any utility can be *LOADed into the RAM directly from Disc with the command *LOAD "FILENAM" 8000 RETURN. This can be done wherever the board is fitted, the slot need not be specified.

| | |
|---|---|
| RAM16 | £32.00 |
| WPK/RAM16 | £2.50 |

**RAMAMP ROM6S**
The ROM board has 6 slots of ROM (ROM6). Each slot can accommodate any 8K or 16K ROM. One can NOT fit RAM at a later date.
The board is fully buffered.
The board is compatible with all D.D.D. Controllers, RAVEN 20 and indeed our own RA20+44. It is compatible with the SOLIDISC 16/32K or 64K sideways ram board.

| | |
|---|---|
| ROM6S | £32.00 |

**RAMAMP RA32+**
The RAM/ROM board has 4 slots of ROM and 2*16K of sideways RAM that is addressed from &8000 to &BFFF. THIS EXTRA RAM IS NOT AN EXTENSION OF MEMORY FOR BASIC.

| | |
|---|---|
| RA32+ | £58.00 |
| WPS+ | £5.00 |

**The RAMAMP boards come complete with RAM inclusive in the price and are fully buffered. Fitting takes only a few minutes. No soldering required. No bits of the I/O port are used. All bits of the I/O port are yours. Free software is available. Write protect switch can be fitted if required.**

**RAVEN 20**
The RAVEN 20 is a 20K RAM Expansion board for the BBC Micro Model B fitted with O.S. 1.2.
The RAVEN Board provides the user with an extra 20K of usable RAM in screen modes 0-3. This together with the aid of software makes the system completely transparent to both the user and the computer. £49.00

## TCL SPECIAL PACKAGE

The BBC Plus all in one Word Processing Package contains a 64K BBC Plus, View 3.0 WP, Hi-Res Green Screen Monitor, 800K Dual Drives, Quendata Printer, Box of Discs, and all the necessary leads and cables housed in a strongly constructed, high impact ABS unit colour matched to the BBC micro giving your BBC Micro System the professional PC look.

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| Econet Interface | £49.00 |
| Speech Interface (Special Offer) | £25.00 |
| 64K Upgrade Kit | £39.95 |
| 17/70 Upgrade Kit | £49.95 |
| ADFS ROM | £29.95 |

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Once again TCL has answered a special need of all BBC Computer users with the new mushroom workstation – no more untidy wiring or pulled plugs. Transforms your system into a handsome console unit.

*Features include:*

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- ★ **On board regulated 4 Amp power supply with overload protection**
- ★ **Mains Input Filter for clean power supply.**
- ★ **Filtered power to the 3 Take-off sockets at rear for Micro, Monitor and Printer.**

**MUSHROOM WORKSTATION**
At a Special Price of **£349.00** inc. VAT

Those people already owning disc drives can have them fitted into the Workstation. Prices on request.

# INTO YOUR HOME

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| 70 x 5¼ Lockable | £9.95 |
| **PRINTER ACCESSORIES** | |
| **TRACTOR ADAPTORS** | |
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| Juki 6100 | £129.00 |
| Quendata DWP 1120 | £114.00 |
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| The Hackers Handbook | £4.95 |
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| 62 64 LP15 | £3.95 |




**DISC**
**Double Sided Double Density 96 T.P.1. Uses 3m media. Guaranteed for life. Free Library Box included** **£20.00**

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## DISC UTILITIES

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| | |
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| **FIRMWARE** | |
| Acorn View Word Processor | £55.00 |
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## MODEMS

**NIGHTINGALE MODEM**
**Special Offer £130.00**
Price includes Commstar ROM and comprehensive manual.

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| Auto Dial/Auto Answer Board | £55.00 |
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**MINOR MIRACLE WS2000**
BT approved, Optional Computer Control, Auto Dial Auto Answer. Options available.

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**DEMON**
With its develishly clever features. Auto Dial, Auto Redial Auto Answer Full and Half Duplex European and USA standards complete with Power Supply Leads and Manuals Full Baud Rates

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| DEMON with BBC ROM | £81.00 |
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## HOW TO ORDER

You may purchase any of the items listed by cheque made payable to TWILLSTAR COMPUTERS LIMITED.

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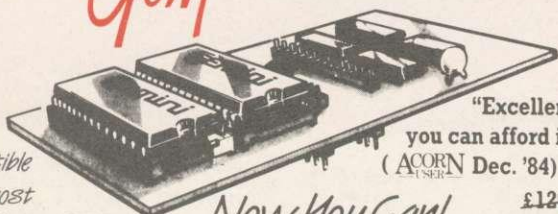
# Twillstar Computers Limited

17 Regina Road, Southall, MIDDLESEX, UB2 5PL

Gemini — ROMS

DATA Gem

**The Definitive Random Access, 24K ROM based Database Management System for the BBC B and BBC B+.**



"Excellent if you can afford it..." (ACORN USER Dec. '84)

Now compatible with most double density DFS's

Now You Can! ~~£129.95~~ £79.95

## DATAGEM

Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right, DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

## AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 x 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

## TECHNICALLY SPEAKING

The System Comprises:-

1. 2 EPROMs mounted on carrier board containing 24K of 6502 optimised machine language. Carrier board may be inserted in either of two positions under keyboard or in sideways ROM board.
2. Demonstration applications disk in both 80 and 40 track format with documented examples of DataGem files. Disk contains no DataGem program code.
3. Full colour packaging consisting of A5 ring binder with professional documentation, user registration card and quick reference card.
4. Utility program named 'Trans' also supplied to allow transference of data files from all other Gemini databases.

The System Features:-

- Permits just ONE file to exist over FOUR floppy disk drive surfaces with a maximum file size of at least 10 Megabytes.
- Allows up to 5100 User Definable Records.
- Maximum number of 62 fields per record, which may be any combination of the following types:-
  STRING – Up to 120 characters long
  DATE – Either two or four digit year dates may be selected.
  TEXT – A field with no data, allowing background text to be placed anywhere on the record. This may then be altered/moved/deleted, even after the database is in use. Up to 3000 characters of background text may be placed on the record in this way, enough for limited word processing and mail-merge.
  NUMERIC
- Allows searches on any field or COMBINATION of fields to ANY depth.
- Up to 9 subsets of data INSTANTLY available and saved to disk automatically.
- Sorts alphabetical or numeric on any field, ascending or descending with NO LIMIT on the depth of sort.
- Interfaces with 'VIEW' and 'WORDWISE'.
- Includes a free format report generator for a completely flexible printing format.
- Allows the user to extend the file or add fields after having started to enter data.
- Offers a free format painted screen which scrolls 120 x 120; and supports extensive mathematics.
- Provides User defined field relational variables and multiple and single character wildcards.
- Exists self contained on ROM, and does not require additional utilities on disk.
- Finds the occurrence of a string or partial string in ANY field in the database with just one command.
- Mathematical Operators
  +, –, ★, /, multilevel parentheses (up to 50 levels), unary negation.
- Logical Operators
  >, <, >=, <=, <>, =, ★(AND), +(OR).

## WHAT OTHERS SAY

DataGem provides many of the Spreadsheet facilities of an item like Lotus 1-2-3... Combined with a Word Processor, it forms the basis of a very competent small business system.
Personal Computer News – July 1984.

DataGem stands out in terms of both price and performance. Excellent if you can afford it.
Acorn User – December 1984.

## NEW DATAGEM GUIDE

Available separately to existing owners of DataGem (see below), this new and comprehensive manual has just been completely re-written by Simon Williams, a veteran press reviewer and writer. The new guide takes you step by step through all the facilities of the program with worked examples, and without any requirement for a previous knowledge of databases. It contains over 40,000 words and is fully indexed.

## MONEY-BACK GUARANTEE

The power and facilities of DataGem are just too great to detail in this advertisement. As the product is protected against unauthorised copying, we are able to offer our no-quibble money-back guarantee to customers purchasing DataGem direct from Gemini. If you don't agree that it's worth the price, send it back to us undamaged within 7 days of purchase for ANY reason and we'll refund your money – immediately.



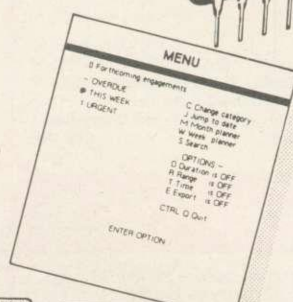

## STOP PRESS!!

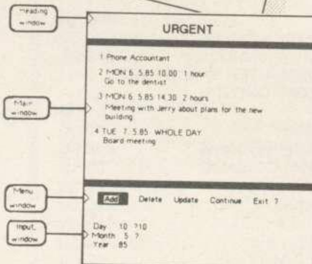
New DataGem owner's manual (see above) available separately at **£12.95** inclusive
Price refundable against purchase!

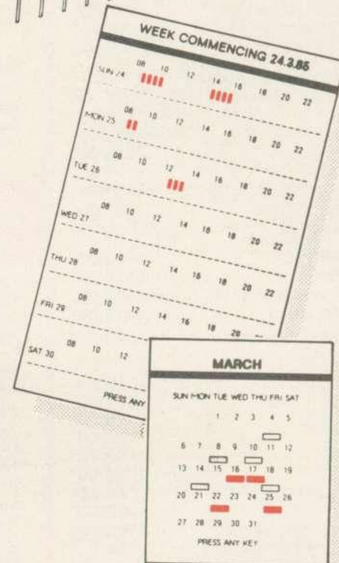
# L.B.O. LIFE & BUSINESS ORGANISER

## – the ULTIMATE BBC utility!




## A NEW & EXCITING ROM RELEASE FROM GEMINI

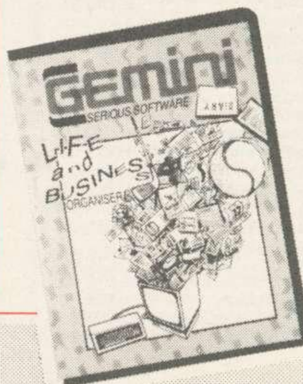
This is a comprehensive life and business organiser package in 100% machine code which has been very carefully designed to provide a wide range of useful facilities for the busy person at home or in the office, and is simplicity itself to use. Once you start using LBO, you'll ALWAYS use it – not like one of those ROMs you only occasionally call on. LBO will put an end to forgetfulness and ensure that your time is organised, you know what you have to do and when, you don't forget bills or birthdays, and you are reminded constantly of urgent matters.

LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

Features include:-

- Automatic reminder of entries overdue for attention
- One week's advance notice of forthcoming events
- Urgent notice board
- Creation of categories of entries; e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day
- Month AND week's summary at a glance, indicating time booked and free
- Single entry of a RANGE of events and updating of regular happenings
- Super search facility to call any event by any related word or part word
- Month by month preview of all forthcoming events
- Built-in intelligent calendar
- All data saved to disk
- Full printer support
- Easy to follow documentation

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are every likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!




**L.B.O.** only **£19.95**

Also available on DISK for those with a cluttered ROM board – £19.95.
QL version also available now, MS-DOS version early 1986.



## DISK SOFTWARE

# DDD Suite

## THE REVOLUTIONARY 'TRIPLE-D' BBC DISK INTEGRATED SOFTWARE SYSTEM

Of great significance to businessmen, educationalists and hobbyists alike, these programs are certainly the most powerful and sophisticated of their breed, and may be used 'stand-alone' or together as a suite. Gemini have probably the most experience in writing serious software for the BBC micro, with classics such as BEEBCALC and BEEBPLOT achieving sales of tens of thousands of units. We have drawn on almost four years of experience and user feedback to produce what we are confident will be hailed as the ultimate in functional software for the BBC micro: the ***'TRIPLE-D'*** Integrated Suite. We've also brought it in at a price that should make it accessible to more of you, and most importantly, we're giving you REAL value for money.

The modules, which are formatted for both 40 and 80 track systems, are available separately, or as an economical combination pack. Each module is clearly documented with a comprehensive, indexed manual, with training sections that refer to demonstration applications provided with each disk. Remember, ***'TRIPLE-D'*** uses proper random-access files that will take advantage of your true disk capacity, even over TWO drive surfaces. Have you ever heard of a true disk-based spreadsheet before? Well it's here now in the form of the ***'TRIPLE-D'*** suite and can handle up to 52,000 FILLED cells! If you already have our 'DataGem' ROM database, you'll be pleased to know we've even included some special utilities for you!

I confidently recommend the ***'TRIPLE-D'*** suite to you. If you purchase the product from us and don't share my enthusiasm, return it to us in new condition within seven days of purchase and we'll refund your money – immediately and without quibble.

*Dale Hubbard*
*Chairman & Managing Director*
*Gemini Marketing Limited*



### -BASE £29.95

- Up to 2000 records, 1 search level subset, 26 fields/record, 2 drives, 79 chars/field
- Scrolling screen, 79 x 26. Interrupt driven real-time clock
- Layout painted on-screen to your design, including background text/graphics
- Fully menu driven, with powerful line editor and access to *OS commands
- Default entry capability, no need for tedious re-typing of repetitive data
- Lightning search using advanced 'hashing' techniques
- Powerful maths, allowing all BASIC functions, on any field
- 10 user-defined variables to simplify complex calculations
- Multiple level 'intelligent' sort – program only sorts 'out-of-order' data
- Printed reports in record or summary format. Data spool option for transfer to other files
- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'



### -CALC £29.95

- True disk-based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor
- Fast, smooth machine code screen scroll with pop-down menu
- Individually adjustable column widths with text overflow
- Full relative and absolute replication
- Find and move to a row by name
- User defined variables, delete/insert rows, SORT rows with 'DDD-Base'
- Send data from all or part of sheet to printer, or just print cell formulae
- Data over 1 or 2 drive surfaces
- Fast recalculation, even over large files
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN'. *OS calls, and real time clock
- Data spool option for merging with other files
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'



### -PLOT £29.95

- Stunning menu driven colour graphics using the BBC's capability to the full
- Pie charts, histograms, scatter graphs, line graphs and function plotting
- Disk save of screen for instant recall within your own programs
- Superb data entry editor with up to 255 plottable data entries for text and x/y coordinates
- Automatic scaling with user override
- Screen customisation allowable after plotting for background text etc., with up to 64 columns in Mode 1
- Disk save of ALL data
- Statistics facilities include mean, max, min, standard deviation, line of best fit, correlation coefficient etc.
- Colours re-definable for any plot
- Epson m/c fully SHADED screen dump with interface for other dumps on request
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-CALC'

***Combo Pack – All 3 modules £69.95***

**NEW!**

# MONEY MANAGEMENT




This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank/Building Society/Investment accounts AND up to 5 Credit card/loan/Mortage accounts.

The transactions are also analysed – and may be (screen) listed – under 3 separate Income and 15 separate Expenditure headings.

Each transaction consists of:
(1) Date
(2) Description – up to 16 characters
(3) Amount
(4) Last 4 digits of cheque no. or a credit card transaction reference. (Payments only)

Account and income/expenditure headings may be personalised.

Budget amounts can be stored for each of the 15 expenditure heads and a report shows how expenditure to date compares with the budget. It also shows the balance remaining. This report is also produced in percentage terms and a third report forecasts annual expenditure based on expenditure to date at any particular time.

A further report gives balances for each Bank/Loan account at the beginning of the year, balances for each income/expenditure account to date and the resultant Bank/loan account balances. This report represents, therefore, the changes in liquid assets and liabilities over the period, both in terms of totals and of distribution between accounts.

The main menu contains a print option for this report.

Lists of outstanding cheques or credit transactions may be produced for each account and when statements are received, input of the cheque reference no. (last 4 digits) and the amount causes verification to occur (on screen), whereafter these cheques are removed from the cheque no. file, the remaining list of unpresented cheques allowing simple reconciliation of each Bank a/c. Similar reconciliation of credit card a/cs can be achieved.

The program caters for transfers between accounts (e.g. from Bank to Building Society a/c or from Bank to Credit card a/c etc) the relevant details being input only once.

The program also allows for standing orders to be set up on any single account or between any two accounts. These are paid simply by inputting a date up to which the payment of all orders should be recorded. The necessary debits and credits are then created and the date of each order is reset. Orders can be for any multiple of calendar months.

The program is fully menu driven and all areas of input are 'range protected'. As much guidance as possible is included in all screen displays and the user is always given the opportunity to abort a transaction.

Full amendment and deletion routines are provided; for individual transactions, for Standing orders and for budgets.

The main file can hold between 800 (all full length descriptions) and 1800 (no descriptions) transactions. The former should be sufficient for most people for at least one year and the index file size is set on this basis. A warning is flashed on the main menu when the main file reaches 750 transactions. Account balances may be carried forward to a new set of accounts.

All you will ever need in a home finance package and beautifully presented.

**ONLY £12.95 Highly Recommended**

# Gemini ⟹ VALUE! ⟹

With over four years experience of providing practical software solutions for business and home applications, Gemini have put together a selected range of famous titles for the BBC and BBC Plus in TWO special packs, at VERY SPECIAL prices. These super value packs contain all the serious application software you're ever likely to need for your BBC, from spreadsheet and database management to a complete professional business accounting system. Gemini's 'OFFICE MATE' and 'OFFICE MASTER' packs are here – put that computer to WORK!




• DATABASE • BEEBCALC SPREADSHEET • BEEBPLOT GRAPHICS • WORD PROCESSOR • FULL DOCUMENTATION

## DATABASE

Use this program for storing all types of information just the way YOU want to store it. You set up a computerised 'card index' system and add records and data to the file in the format that you choose.

Advanced features include sorting and searching for specific records, mathematical calculations, printer routines, data summaries etc. If you don't have a database, you certainly should!

## BEEBCALC SPREADSHEET

Perhaps the most commercially successful item of business software yet written, the Gemini Spread Sheet processor offers a very wide range of invaluable calculation and editing features.

Consider, for example, a Cash Flow forecast containing rows and columns of figures, combined with text and numbers. If say, the cash receipts for January need to be changed, it would normally be necessary to delete and recalculate several figures for each successive month.

With BEEBCALC, however, an 'on screen' amendment to the January figure is made, and the corrected figures for each successive month automatically appear upon touching the 're-calculate' key.

Formulae cells in the table may be specified which relate to each other and then copied RELATIVELY or ABSOLUTELY to other parts of the program, which in itself is modular, and directly linkable to other Gemini programs. BEEBCALC has a complete range of inbuilt data entry and formatting techniques, and the structure of the table may be amended at any stage. Of course, full printer facilities are included which allow for either the table to be printed or just the data and formulae relating to the table. Another important feature, any valid BBC BASIC formula is acceptable as data entry making the system immensely powerful and versatile. BEEBCALC's sister program, BEEBPLOT will take data from disk or tape files created by BEEBCALC to provide data portrayal in graph, histogram or pie chart format.

## BEEBPLOT Graphics

Written specially for use with the BBC micro, this program makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

For example monthly sales statistics comparing two year's results may be instantly converted into two side by side pie charts, histograms or graphs ... for easier visual comparison and assimilation.

BEEBPLOT also incorporates a built-in machine code screen dump, enabling a high resolution printed image to be produced using an Epson or similar bit image compatible printer. It also interfaces with other Gemini programs such as Beebcalc and Cash Book and is particularly recommended where any kind of mathematical plotting facility is required.

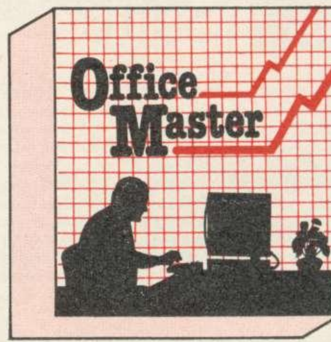
## *WORD PROCESSOR*

This program provides many routines found in large and more expensive packages. With a typical word length of 5-6 letters it allows for up to 1000 words in memory at one time and is ideal for the user who wishes to write any kind of business letter on a home computer.

Features include: block delete, block insert, search and replace, edit text, display text, and many more.

**Step up to Office Mate and save money!**
**(Price if purchased individually - £79.80**
**– save £67.80 with this pack)**
**Electron version available,**
**pack contains Database, Beebplot, Beebcalc, Home Accounts,**
**Cassette only.**

**OFFICE MATE £12** Cassette or Disk




• CASH BOOK • FINAL ACCOUNTS • MAILIST • EASILEDGER • INVOICES & STATEMENTS • STOCK CONTROL • FULL DOCUMENTATION

## CASH BOOK

Gemini's CASHBOOK is a complete 'stand-alone' accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cash book system and will provide you with a computerised system complete to trial balance.

Simple to use, this program will replace your manual cash and bank records and provide vital management information at any time. It will take you from sheaves of invoices and cheque book stubs to trial balance, and may, if desired, be used in conjunction with the Final Account program.

Typical information from CASHBOOK is as follows: **1.** Summary of VAT information to enable completion of VAT returns. **2.** Cumulative receipts and payments report analysed over the standard profit and loss and balance sheet headings. **3.** Option for departmental analysis of sales and purchases. **4.** Printout of all transactions, nominal account balances etc. **5.** Journal routine for entering transfers between accounts and year end adjustment for debtors, creditors, etc. **6.** Trial balance. **7.** Full audit trail facility.

This program is recommended not only for businessmen, but also for practising Accountants for use in the preparation of Accounts from incomplete records; a printer is essential.

## FINAL ACCOUNTS

Requires Gemini 'CASHBOOK' module (except Commodore 64 version)

This program will take data prepared by your Gemini Cashbook module and produce a complete set of accounts for you in the following format: **1.** Trial Balance with inbuilt rounding routine. **2.** Notes to the Accounts. **3.** VAT summary. **4.** Profit and Loss Account with comparatives facility. **5.** Balance Sheet with comparatives.

All reports may be produced at any time interval comparing actual to budget if required.

## MAIL LIST

Gemini's Mailist program will enable you to keep a record of names and addresses and then print, examine, sort and find themn, all with special selection techniques. All our mailists contain our exclusive 'SEARCHKEY' system, giving you the option of creating your own dedicated coding system for each name on file. For example, on most mailing list systems, you are only given the standard heading such as name, street, town, country, postcode etc. With the Gemini searchkey system, you could find, say, all names on the file that are companies having a turnover in excess of '50,000' or all names that are subscribers who are behind in their subscriptions or all names that are eligible for a Christmas card this year!

A full and useful range of routines is included in the menu, and the program allows you to set up your own format for printing labels, i.e. the tab settings you require and spaces between labels, etc. Multiple copies can also be printed.

## EASILEDGER

Contains routines to enable the small business man to keep a record of one of the most important aspects of his business – cash flow.

EASILEDGER is essentially a debit/credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information. Its flexibility lies in its ability to produce account balances instantly for debtors and creditors, together with a record of all transactions, dates and references. A year-to-date summary of sales, purchases, receipts and payments over the twelve month period is also provided, as is a complete INTERACTIVE bank account database.

EASILEDGER is a management aid software tool and is designed to run alongside an existing accounting system. If you operate a cash based business and require a complete accounting package to produce the accounts to trial balance and beyond then we recommend you consider using both Easiledger and Cashbook programs together.

## INVOICES & STATEMENTS

The Gemini INVSTAT program greatly reduces the time and cost of preparing Invoices and Statements by storing essential information such as customer names, addresses and account numbers, VAT routines and footer messages such as *'Please remit by return', 'Overdue and outstanding', etc.*

Not only are Invoices and Statements produced more quickly and accurately, but pre-printed forms for them are eliminated since the INVSTAT program produces professionally formatted documents using your own printer.

## STOCK CONTROL

You have a stock of products. With the Gemini program you may enter details of each product on to a record card on the computer with details of your own existing part number (if any), a description of the product, the unit quantity (i.e. one, a gross, a pair, etc.), the cost price per unit, the selling price per unit, a specified minimum satisfactory stock level, units in stock ordering quantity and supplier details.

The program will allow you to enter stock received, stock out, and will also give you a summary of stock items and current holding, together with details of total cost of stock, total sales value of stock, current gross margin on stock, cost of bringing stock up to minimum level, understocked items, etc.

Each stock item has its own computerised record and you may browse through the file as a whole, or just a specified number of records. An extremely powerful program, highly recommended for inventory control in small and medium sized businesses.

**OFFICE MASTER £25** Cassette or Disk

# Gemini INTEGRATED ACCOUNTS & HARDWARE

## WHY INTEGRATED ACCOUNTING?

Because it will retrieve information stored in one program for use by another, and store data in one program which has been generated by another.

This means that the scope for human transposition error is virtually eliminated ... for example, when typing an invoice manually, the typist could type £14.25 instead of £41.25, and undercharge the customer. Such an error cannot occur with integrated, computerised invoice generation, since only the part number needs to be entered and the price (and product description), are taken AUTOMATICALLY from the Stock Control program, and printed AUTOMATICALLY onto the Invoice.

Likewise a Stock Controller, operating a manual system, could transpose the quantity sold, when posting from a copy invoice, and deduct 93 pcs from the Stock card, instead of 39. This would understate the book stock by 54 pcs, and possibly cause the product to be re-ordered, and consequently overstocked. Again, this could not happen with an integrated system, since the quantity invoiced is AUTOMATICALLY deducted from stock, due to integration of the Invoicing and Stock Control programs.

## WHY THE BBC MICRO?

Because, although originally designed as an educational computer, it has the facilities needed for serious business use. In particular, speed of operation ... although only an 8 bit machine, it has a faster operating speed than many 16 bit micros. By gearing a suite of Integrated Accounting programs to the BBC Micro, Gemini have produced a combination of excellence which will eclipse any other computerised business system in its price bracket ... and many other systems in much higher price ranges.

## WHY GEMINI?

Because our business software for the BBC Micro is based upon the solid foundation of experience.

We have successfully written business software for the BBC Micro since it was first launched.

Your choice of software for a computerised business system is critical ... badly written programs could bring your business nearer to ruin, more quickly than almost any other investment. The fine reputation of Gemini, evidenced by the Independent press comments listed below, are your guarantee of confidence in the professional experience which back this major investment in the efficiency of your business.

## INTRODUCTION

Designed for the small to medium sized business user, where speed and efficiency are vital, Gemini Integrated programs are suitable for sole traders, partnerships, or limited companies. All require a BBC B 32K microcomputer, and an 80 column printer. A double disk drive with an Acorn compatible DFS is required for integrated accounting purposes. A single disk drive may be sufficient where modules are used independently, although this is not recommended for the Sales Ledger and Invoicing module. The manuals indicate the system capacities for various disk drive combinations.

The programs have been devised by H.C.C.S Ltd in the light of substantial mainframe computing experience, and share many of the features normally found only in very large installations. Used in a typical business environment where invoicing, sales ledger posting, stock control adjustment and nominal ledger posting is simultaneously made, the software will convert the BBC micro into a business computer of enormous power, directly comparable with hardware/software combinations costing many times its price.

Each program is supported by a comprehensive, easily followed manual, and 'user friendly' screen prompts with error trapping routines, which make a specialised knowledge of accountancy unnecessary for the average user. All the programs, however, have many sophisticated features which make the programs revolutionary for the home micro market.

Gemini Marketing Limited confidently recommend the programs to serious commercial owners of the BBC B micro as software capable of making an enormous contribution to business efficiency and profitability at minimal cost, since it requires no expensive second processor in order to achieve the advantages of integrated accounting.

**NEW LOW PRICE** Price **£69.95** per Module




**Includes 1 year software support**

## INDEPENDENT PRESS COMMENTS

John Vogler reporting in December 1984 edition of 'A & B Computing' said of Gemini Integrated Accounting when comparing to Peartree, Micro Aid, Software for All, Acornsoft Mirle and Sage:–

"This is the newest and most exciting. To have achieved a substantial degree of integration, very rapid file access and respectably large file sizes, without the use of a second processor, is a fine achievement. As one would expect from GEMINI, the individual modules are eminently professional and for the first time present the single processor BBC as a viable small business computer ... GEMINI have produced a superb product ... superb examples of the programmer's art."

## INVOICING & SALES LEDGER

The Gemini Sales Ledger and Invoicing program will produce invoices and statements for customers and enable a tight control over credit procedures to be maintained by producing aged debtors reports, and by keeping current information concerning customer accounts.

The module can be used independently or interfaced with the Gemini Nominal Ledger and Stock Control modules, and offers the following advantages: • Maintains open-item sales ledger. • Comprehensive customer Master File maintained in memory. • Choice of fixed and free format invoices. • Integrates with Gemini Nominal Ledger and Stock Control modules. • Prints invoices, invoice copies, statements and credit notes. • Reports include: Aged Debtors, Sales Daybook Sales analysis by user defined code, VAT analysis, Audit trail giving copy details of all transactions. • Automatic updating of sales ledger. • Comprehensive accounting controls including period end close down routines and full audit trail for all transactions. • Examine customer status by file enquiry to screen or printer showing year to date activity. • Trade and settlement discount terms definable for each customer. • Caters for up to 5 rates of VAT. • Can hold up to 135 customers on 40 track disk system and up to 610 customers on a 80 track disc per Sales Ledger file. • Comprehensive analysis of invoices over unlimited, user definable sales codes. **Price £69.95.**

## PURCHASE LEDGER

Used independently or interfaced with the Gemini Nominal Ledger, the program maintains a complete file for each supplier, records amounts outstanding at any time, helps to determine which invoices are payable, and payment dates for the claiming of discounts. Among this module's many features are the following: • Automatic posting of suppliers' invoices to Purchase Ledger. • Comprehensive analysis of invoices over unlimited, user definable expense headings. • Comprehensive accounting controls including period end close down routines with posting reports, and full audit trail facilities at appropriate stages of processing. • Full integration with Gemini Nominal Ledger module. • Purchase invoices and credit notes easily processed. • Supplier file held in memory, with full details of each supplier. • Maintains open item purchase Ledger. • Management of invoices due for payment within cash restraints. • Maximum number of suppliers on 40 track disk system of 135 and maximum of 610 suppliers on 80 track disk system per Purchase Ledger file. **Price £69.96**

## NOMINAL LEDGER

This is the central module of the Integrated Accounting system and may also be used independently as a Cash Book or interfaced with the Sales and Purchase Ledgers and payroll programs. It includes the following main features: • 143 Nominal accounts all of which are user-definable. • Posting of transactions from Sales and Purchase Ledgers and Payroll modules. • Full Cash Book facilities. • Print out of full Trading and Profit and Loss Account and Balance Sheet together with notes to the accounts. • Full accounts may be produced for whatever period chosen by the user. • Comprehensive accounting controls including period end close down routines and complete audit trail for all transactions. • Journal feature for adjustments between accounts and correction of book-keeping errors. • Reports include: Account Master File showing complete code listing. Cash Book entry details. Journal printouts. Trial Balance. Trading and Profit and Loss Account with notes. Balance Sheet with notes. Audit Trail Enquiry for all accounts. • Account enquiry showing movements over the period under review including opening balance, period end adjustments and closing balance. • Account posting masks allow conversion of analysis codes set up in other modules into selected user-defined Nominal Ledger codes. **Price £69.95**

## PAYROLL

This program provides a full range of controls over the different aspects of Payroll Accounting icluding tax and other deductions. It can be used independently, or interfaced with the Gemini Nominal Ledger, and offers the following facilities: • Employee file maintained in memory, containig: Name, address, sex, marital status, National Insurance Number and contribution type, date of birth, personnel number, department, date employment commenced, all applicable tax codes, whether week 1 or month 1 applicable, hourly or salaried, pay cycle, payment type (cash, cheque or direct transfer), PAYE reference number, previous name, bank details. • Supports weekly, fortnightly, four weekly or monthly employees. • Company master file containing: Name, address, bank account number and name, bank name and branch, PAYE reference. • Produces cash analysis of note and coinage to suit requirements. • Employee pay details include: Gross pay and tax paid to date both current and previous employer. National Insurance contribution for employer and employee. Five rates of overtime per employee. Up to 12 standard and 5 non-standard pay elements per employee. Basic pay. Hourly rate. • Reports include: Payroll reconciliation, Payslips, Coinage analysis, Cheque and bank giro list, Payroll masterfile, Departmental analysis. • Relevant data to complete Inland Revenue forms including: P11, P35, P45, P14/P60. • Maximum 98 employees on 40 track disk system and 198 employees on 80 track system per Payroll file. **Price £69.95**

## STOCK CONTROL

A program providing full control over every aspect of stockholding operations which can be interfaced with the Gemini Sales Ledger and Invoicing program, this module includes the following features and routines: • Inventory Master File holding details of part number, selling and cost price, sales and product code, current stock, location of stock, allocated items, re-order level, quantity on order, current period activity and supplier code. • Permits four types of transactions – sales, returns, receipts and adjustments. • Part enquiry routines for any stock item. • Reports include: Part catalogue, giving stock sales and cost values. Re-order report. Evaluation stocks list, giving stock sales and cost values. Dormant parts report. Delete parts report. Stock usage report. Stocktaking sheet. Stock audit report sorted into part sequence and transaction type and date. • Screen prompt when item falls below the minimum re-order level. • Directly interfaces with Sales Ledger to enable automatic generation of product details for invoice production and adjustment of stock records. • Maximum 980 part numbers on 40 track disk and 1980 on 80 track disk per stock file. **Price £69.96**

Gemini Midi Maxi Offices, sole distributors to the trade –

**CentreSoft Ltd**

Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham, B7 4LY. Tel: 021 359 3020. (Mail order to Gemini).

## Special Hardware/Software OFFERS

Having arranged bulk hardware purchasing discounts, Gemini is now able to offer complete systems of hardware and software offering unequalled value for money. We offer a choice of hardware only or hardware with software as follows:–

### DEAL 1

BBC SYSTEM comprising:–

- BBC 32K with DFS
- 40/80 switchable 800K double disk drive
- 80 column printer
- 12" screen monitor (for colour add £150 to system price)
- All connecting cables

**OUR PRICE INC. VAT £999.95**

**MS-DOS version soon.**

Please enquire by telephone for prices of individual hardware items.

### DEAL 2

DEAL 1 with the addition of the following:–

- 'DDD' Integrated database, spreadsheet and graphics
- DataGem database ROM
- Integrated Accounts – ALL 5 MODULES
- Mail Merge utility for Integrated Accounts
- 'Video Classroom' programming educational video (VHS only)
- 'Life & Business Organiser' ROM
- 'Maxi Office' software pack
- 1 pack each pre-printed stationery; payslips, statements, remittance advice, invoices for use with integrated suite, plus one box 2000 sheets listing paper.

**USUAL PRICE £1650 – OUR PRICE INC. VAT £1395**

If not ordering by telephone, please use this order form to order any item on this page, or three preceeding pages. Please state your requirements clearly, and whether you require 40 or 80 track format when ordering disks. Please allow 7 days for delivery.

24 hour CREDIT CARD HOTLINE – AMEX/ACCESS only – 0395-265165

All stated prices include VAT and post/packing.



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Address ______________________

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Cheque/POs value £________ enclosed, or please debit my Access/Amex no.________

Signature ______________________

Export/Trade enquiries and Local Authority POs welcome.

AU

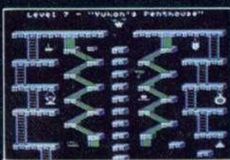
# BOUNTY BOB STRIKES BACK!

**Twenty-five Levels.**

**Multi Channel Music.**

**Dual Joystick Capability.**

"Bounty Bob Strikes Back" is the sequel to "Miner 2049er" which was a huge success on the Commodore 64 and Atari machines. Now on the Amstrad, this version features Bob's toughest challenge to date and he needs your help more than ever before to guide him through the mine. The mutant organisms within have multiplied and over run the mine entirely, making it extremely difficult to survive the hazards of the underground passageways. Using high powered special equipment in the twenty-five caverns is Bob's only hope of achieving his objective of securing the mine and defeating the evil plans of Yukon Yohan.



# BEACH-HEAD

**Multiscreen 3-D Arcade Action**

A peaceful island is being held by a ruthless dictator and his troops. As Chief Commander of land and sea forces in the Pacific, you must obtain a quick naval victory and then invade the island with land forces. If your troops succeed in penetrating the island defence systems, the most difficult challenge still remains; capturing the enemy fortress of Khun-Lin.

Beach-Head is a multiscreen action game which requires different skills and provides new sequences as you progress through the game.




# BRUCE LEE

**Twenty secret chambers to explore**

**Unique multiple player options**

**Dazzling graphics and animation**

In "Bruce Lee" you will experience the power and the glory of Bruce Lee, one the greatest masters of the martial arts.

As Bruce Lee, you will confront a barrag of vicious foes. You must penetrate the fortress of the Evil Wizard and claim h fortunes. Destroying the Wizard will ea you immortality and infinite wealth!



## THE BEST OF AMERICA..

## U.S. GOLD ON THE BBC*– NOW

## RAID!

**Gripping Arcade Action**

**Multiple 3-D Scrolling Screens**

The scene is one of World-wide conflict. The only hope of saving the World from nuclear annihilation is an attack by stealth bombers on the launch sites.

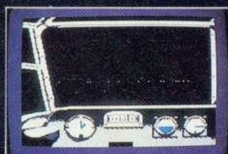
As squadron leader, you must lead your troops on a virtual suicide mission; knock-out the launch sites, and proceed to the command headquarters. Armed only with the weapons you carry, you must destroy the defence centre and stop the attack!



## DAMBUSTERS

**Superb Graphics and Sound**

At 21.15 hours on the evening of May 16th 1943, a flight of specially prepared Lancaster bombers left R.A.F. Scampton for Germany. And so, one of the most daring and courageous raids of the Second World War was underway. Now you have the opportunity to relive the drama and excitement of this famous action via your Amstrad computer. You will take the parts of Pilot, Navigator, Front and Rear Gunners, Bomb Aimer and Flight Engineer as you play this authentic reconstruction of the night's events. The multiple screen action is complemented by a comprehensive package of flight documents and authentic material from the period.



## IMPOSSIBLE MISSION

**Game of the Year 1985- British Micro Awards**

Message from the Agency computer.....

"....Your mission, Agent 4125 is to foil a horrible plot. From an underground laboratory, Elvin, the scientist, is holding the world hostage under threat of nuclear annihilation. You must penetrate his stronghold, avoid his human-seeking robots and find pieces of the security code.

Somersault over the robots or use a precious snooze code to deactivate them long enough to search each room. Use the Agency's computer to unscramble the



passwords from the code pieces, or try to solve them yourself. You'd better beware.....This mission is stamped IMPOSSIBLE!"

# COMING THIS AUTUMN




U.S. Gold Limited, Unit 10,
The Parkway Industrial Centre
Heneage Street, Birmingham B7 4LY.
Telephone: 021-359 8881 Telex: 337268.

# OU CAN PLAY THE GAME TOO!

*All screen shots as seen on the Commodore 64

# FLEET STREET EDITOR

Issue No.1 January 1986

GIVES YOU WORDS ... AND PICTURES

In any way you wish – **together** or separately ...





If **you** find yourself in the newssheet hotseat...

Fleet Street Editor is the personal publishing package you must have.







You can use text in many ways: regular, **bold**, inverse and, of course, with fancy

Headlines&Titles in your text.

All this, and more, can be done in this one package – with nothing extra to buy!




Mirrorsoft



## THE FIRST EDITION

**Publication: January 23rd 1986**

The minimum equipment you need to become a FLEET STREET EDITOR is:

* BBC Model B with disk interface
* 40 track single-sided disk drive
* Dot matrix printer capable of 640 dot bit image mode and true descenders
* Monochrome monitor or TV

You can configure the program to any type of drive combination via the Administration department.

FLEET STREET EDITOR is supplied on two disks – one containing the program and one containing the graphics library. These are formulated in different ways for different drive configurations, so take care when ordering or buying FLEET STREET EDITOR that it matches your current system. Upgrades are available.

The registration card supplied in the back of the manual, when completed and returned to us, will ensure you receive details of new software designed to enhance your FLEET STREET EDITOR.

Complete the coupon and return it to us for a detailed brochure or to place a firm order. FLEET STREET EDITOR should also be available from good software stockists everywhere.

**ORDERS**

I would like to order FLEET STREET EDITOR. Please tick ☐

My disk system is as follows:

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I enclose my cheque No.__________for £39.95 OR

Please debit my Access/Visa account no.

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Signature____________________

Please allow 21 days for delivery

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Please send your detailed brochure on FLEET STREET EDITOR Please tick ☐

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Address____________________

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# SOFTWARE, FIRMWARE AND HARDWARE FOR YOUR BBC

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New for the family genealogist. Trace your ancestors and descendants.
Find out who your cousins are. (As used by members of family history societies).



PERSONALISED SOFTWARE
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**(WEEKLY, FORTNIGHTLY, FOUR WEEKLY AND MONTHLY)**
Disc only version of our very popular PAYROLL with extensions to include three O/T rates, SSP, contracted in and out, pensions, personnel records and many other features – £49.95 + VAT.

ACCOUNT and CASHBOOK d PROGRAM OWNERS
Please note we can now offer monthly analysis feature. Return your disc with £10.00 for upgrade.

## Top Mailing Program

RANDOM MAILING up to 1850 addresses, names, phone numbers & codes one disc. Selective printing any number of labels, repeat, stationery or fan fold. Automatic WORDWISE & letters produced repeatedly with personalised names many other features such as automatic sorting by company or personal names. By far the best and most comprehensive program of its type for the BBC Micro Price £29.95 + VAT

## SPECIAL OFFER

**IBICO LTR-1 LETTER QUALITY PRINTER**

**FEATURES INCLUDE**
- Fully formed font impact printer
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- Character style Elite 12
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- Weight 3 kgs
- Dimensions W 29.8cms, H 6.3cms, L 19.8cms

**£99**

ADD VAT TO ALL PRICES
ADD £1.75 FOR PROGRAMS ON 40 or 80 TRACK DISC
No post charge in UK

## memo·calc

107 MEMO-CALC £12.95 B C/D
"IT MUST BE AMONG THE LEAST EXPENSIVE PIECES OF USEFUL SOFTWARE YOU WILL EVER BUY" Revue by Practical Computing July 1983.

Database/calcsheet program which allows up to 255 columns. The number of rows is automatically set from 5 to over 1000 depending on the columns declared. Both numeric and alphanumeric data can be stored in any cell and can be of any length up to 255 characters.

There are a multitude of uses for this program from accounts to diaries, club or personnel records etc. and is probably the one program that we all need. MODE7
107a Manual for MEMO-CALC included free otherwise £2.00 (0% VAT)

## PAYROLL

Part 1 is a BASIC program running in MODE7 which accepts new data on employees, allows additions, deletions and alterations, listing of P35 & automatic alterations to the codes as required by tax notice P7X. Fully 'user friendly' with colour and graphics to make life simple for the operator.
Part 2 (WEEKLY) or Part 3 (MONTHLY) is designed to handle the calculations of wages and N.I. It allows for standard pay, two overtime rates, optional pension funds (monthly only) other pay, holiday pay, bonuses, post-tax adjustments and no pay.
106b COIN ANALYSIS £4.95 B C/D
106c PENSION £4.95 B C/D EXTRA
106d PAYSLIP FORMS £25.00 per 1000 EXTRA

Buy direct or Prestel No. 25821534.

£27.95 + VAT

## CASHBOOK

102 CASHBOOK £11.95 B C/D
FIRST CHOICE This is a double entry cashbook program showing cash and bank credits and debits. i.e. 4 columns. Any number of individual accounts can be used and analysed or totalled individually or cumulatively by associated group. A friendly but very practical, and reliable program which despite its low cost is used by many people in a range of situations from domestic and clubs to schools and businesses. MODE7
102d CASHBOOKd £19.95 B D
SECOND CHOICE This version of the above program uses random access disc files and can hold up to 1250 entries on 100K discs and up to 2500 on 200k discs. There is sophisticated protection against unauthorised use built in. MODE 7
102f ACCOUNT £29.95 B D
THIRD CHOICE This version of the above program uses random access disc files and an hold up to 1100 entries on 100K discs, and up to 2250 on 200K discs. Included is a choice of CASH/BANK or VAT/BANK headings. Over 830000 possible accounts combinations. Ledger sheets and summaries can be printed as well as full accounts. The latest balance is available at any time. This program is only available on disc MODE 7

## EPROMS
## 2764 £2.75
## 27128 £3.00

BUY DIRECT THROUGH PRESTEL (Page * 2582020) using your Access Card

B: BBC Model B   A: For BBC Model A   D: Disc
E: For the Electron   C: Cassette

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## Micro-Aid
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# SAVE POUNDS ON THESE COMPUTER SUPPLIES

★ SPECIAL OFFER ★

**UNBRANDED 5¼″ DISCS**

5 year warranty – hub rings – envelopes – labels – write protect tabs.
*10 Discs packed in FREE plastic library box*

**SS/DD 48 TPI 40 Track £9.90**
**DS DD 48 TPI 40 Track £10.90**
**DS DD 96 TPI 80 Track £14.70**

MICRO MEDIA
**0707 52698**

## 5¼″ DISCS

| PRICES PER BOX OF 10 | 1 Box | 2 Bxs | 3 Bxs |
|---|---|---|---|
| **CUMANA** | | | |
| DS/DD 96 TPI 80 Track | 18.30 | 17.40 | 15.90 |
| Packed in SEE 10 library box. | | | |
| **NASHUA** 5 YEAR GUARANTEE | | | |
| SS/DD 48 TPI 40 Track | 11.85 | 11.40 | 11.00 |
| DS/DD 48 TPI 40 Track | 14.75 | 14.50 | 14.15 |
| SS/DD 96 TPI 80 Track | 17.50 | 16.45 | 15.00 |
| DS/DD 96 TPI 80 Track | 19.20 | 18.05 | 17.00 |
| **3M** LIFETIME GUARANTEE | | | |
| SS/DD 48 TPI 40 Track | 13.96 | 13.48 | 12.30 |
| DS/DD 48 TPI 40 Track | 18.96 | 18.22 | 16.57 |
| SS/DD 96 TPI 80 Track | 21.65 | 20.78 | 18.57 |
| DS/DD 96 TPI 80 Track | 24.87 | 24.00 | 21.43 |
| DS HD 1.6 MB 96 TPI | 44.83 | 41.93 | 39.11 |
| **VERBATIM DATALIFE** | | | |
| SS/DD 48 TPI 40 Track | 16.40 | 15.29 | 14.28 |
| DS/DD 48 TPI 40 Track | 21.30 | 19.95 | 18.70 |
| SS/DD 96 TPI 80 Track | 21.75 | 20.60 | 19.35 |
| DS/DD 96 TPI 80 Track | 27.70 | 25.95 | 24.30 |

## 3½″ DISCS

| | | | |
|---|---|---|---|
| **3M** | | | |
| SS/DD 135 TPI | 28.60 | 26.50 | 24.80 |
| DS/DD 135 TPI | 42.60 | 39.70 | 37.00 |

## 3″ DISCS

| | | | |
|---|---|---|---|
| **MAXELL** | | | |
| SS/DD | 41.50 | 39.00 | 37.00 |
| DS/DD | 41.90 | 39.70 | 38.00 |

**For Quantity Discounts and Bulk Pack Prices ring 0707 52698**

## DISC CARE

| | | | |
|---|---|---|---|
| 5¼″ Head Cleaning Disk with 15ml cleaning solution | 5.88 | 5.57 | 5.25 |

## DISC STORAGE BOXES

| | | | |
|---|---|---|---|
| Plastic library case 5¼ x 10 | 1.70 | 1.60 | 1.40 |
| SEE 10 5¼x10 | 2.15 | 2.09 | 2.03 |
| REXEL 5¼ x 30 | 6.20 | 5.85 | 5.40 |
| ABA LOCK LID 5¼ x 40 | 10.90 | 10.50 | 10.25 |
| ROCKFORT 5¼ x 50 | 8.50 | 7.90 | 7.00 |
| ABA LOCK LID 5¼ x 80 | 12.90 | 12.60 | 12.25 |

## COMPUTER LISTING PAPER

All paper plain, fanfold with micro perf edges

| Size | Weight | Boxed Sheets | | | |
|---|---|---|---|---|---|
| 11 x 9½ | 60gsm | 2000 | 14.30 | 12.91 | 12.12 |
| | 60gsm | 1000 | 8.66 | 7.48 | 7.01 |
| | 60gsm | 500 | 5.37 | 4.38 | 3.94 |
| | 80gsm | 2000 | 17.94 | 15.51 | 14.37 |
| | 80gsm | 1000 | 10.17 | 9.39 | 8.24 |
| | 80gsm | 500 | 6.09 | 5.17 | 4.34 |
| EXACT A4 | 70gsm | 2000 | 21.55 | 19.25 | 17.75 |
| 11⅔ x 9¼ | 70gsm | 1000 | 12.20 | 11.70 | 10.05 |
| | 70gsm | 500 | 6.15 | 5.29 | 4.80 |
| | 90gsm | 1000 | 12.70 | 11.70 | 10.08 |
| | 90gsm | 500 | 7.65 | 6.57 | 6.05 |

## COMPUTER LABELS

Continuous fanfold sprocket fed labels

| | 1,000 | 2,000 | 3,000 |
|---|---|---|---|
| 89 x 36 | 5.35 | 4.85 | 4.20 |
| 89 x 49 | 7.40 | 6.55 | 5.75 |
| 102 x 36 | 5.65 | 5.10 | 4.40 |

Please state no of labels across sheets (1 or 2)

**Many other sizes available. Ring 0707 52698**

## PRINTER RIBBONS

| Price each per ribbon | 1 | 3+ | 6+ |
|---|---|---|---|
| **BROTHER** HR 5 | 3.00 | 2.70 | 2.50 |
| EP 44 | 2.30 | 2.05 | 1.90 |
| M 1009 | 4.00 | 3.70 | 3.40 |
| EM 100/200 Correctable | 2.80 | 2.55 | 2.35 |
| Red Blue Brown Correctable | 4.05 | 3.75 | 3.45 |
| HR 15/25 – Multi-Strike | 4.75 | 4.40 | 4.15 |
| HR 15/25 – Fabric | 4.20 | 3.80 | 3.45 |
| **CANON** PW 1156A/1080 | 5.95 | 5.45 | 5.05 |
| **COMMODORE (CBM)** | | | |
| 4022/2022 | 3.90 | 3.55 | 3.25 |
| 4023/1526 Fabric | 4.75 | 4.30 | 4.00 |
| 4023/1526 Multi-Strike | 4.60 | 4.15 | 3.85 |
| MPS 801 | 4.30 | 3.90 | 3.60 |
| MPS 802 | same as 1526 | | |
| **C. ITOH** 8510/8510A | 4.00 | 3.65 | 3.35 |
| **DAISYSTEP** 2000 Multi-Strike | 3.45 | 3.15 | 2.90 |
| 2000 Fabric | 5.45 | 5.05 | 4.75 |
| **EPSON** FX/MX/RX 80 | 3.90 | 3.55 | 3.25 |
| Red Brown Blue | 5.20 | 4.80 | 4.50 |
| LX 80 | 4.25 | 4.05 | 3.90 |
| MX 100 | 5.05 | 4.60 | 4.20 |
| LQ 1500 | 5.75 | 5.25 | 4.80 |
| DX 100 Multi-Strike | 4.70 | 4.35 | 4.10 |
| DX 100 Fabric | 4.20 | 3.85 | 3.45 |
| **JUKI** 6100 Multi-Strike | 2.75 | 2.45 | 2.30 |
| 6100 Single Strike | 1.70 | 1.50 | 1.40 |
| 6300 Multi-Strike | 2.65 | 2.40 | 2.20 |
| 6300 Fabric | 3.55 | 3.20 | 3.00 |
| 2200 Single Strike | 2.55 | 2.30 | 2.10 |
| 2200 Correctable | 2.50 | 2.25 | 2.10 |
| **KAGA** KP 810/910 | 5.95 | 5.45 | 5.05 |
| **M/TALLY** MT 80 Fabric | 4.75 | 4.35 | 4.00 |
| MT 80 Multi-Strike | 4.60 | 4.20 | 3.85 |
| **M/PERIPHALS** MP 165 | 3.90 | 3.55 | 3.25 |
| **NEC** PC 8023 | 4.00 | 3.65 | 3.35 |
| **OKI** MICROLINE 80/82/83 | 1.80 | 1.60 | 1.50 |
| **QUENDATA** 2000 Multi-Strike | 3.45 | 3.15 | 2.90 |
| 2000 Fabric | 5.45 | 5.05 | 4.70 |
| **RITEMAN** 80 | 6.45 | 5.95 | 5.70 |
| **SEIKOSHA** GP 80 | 3.45 | 3.15 | 2.90 |
| GP 100/250 | 3.75 | 3.40 | 3.15 |
| GP 500 | 4.30 | 3.90 | 3.60 |
| **SHINWA** CP 80 Multi-Strike | 4.60 | 4.20 | 3.85 |
| CP 80 Fabric | 4.75 | 4.35 | 4.00 |
| **STAR GEMINI** 10x / 15x | 1.80 | 1.60 | 1.50 |
| **RADIX** 10 | 5.75 | 5.35 | 5.05 |
| **WALTERS** WM 80 Multi-Strike | 4.60 | 4.20 | 3.85 |
| WM 80 Fabric | 4.75 | 4.35 | 4.00 |
| WM 2000 | 5.15 | 4.75 | 4.40 |

**If the ribbon you require is not listed ring 0707 52698 and let us quote**

## FLOWCHART TEMPLATE

19 symbols 1/16 & 1/10 graduations 1.29

## PRINTER LEAD

Centronics lead to connect BBC Micro to Epson Kaga Canon etc
1 mtr – 6.50
2 mtr – 8.50

## CONTRAST ENHANCEMENT ANTI-GLARE SCREEN

12″ or 14″ 19.25

**ALL PRICES INCLUSIVE OF POSTAGE & PACKING**
**Please add VAT at 15%**

MICRO MEDIA Computer Supplies
Rydal Mount Baker Street
Potters Bar Herts EN6 2BP
Telephone: (0707) 52698







Personal Callers Welcome

Trade and Educational Enquiries Welcomed

- MICRO MEDIA -

Micro Media, Rydal Mount, Baker Street, Potters Bar, Herts EN6 2BP
Telephones: 0707 52698 & 50913

# SOLIDISK AND M

We pick up the best names in Wordprocessing software, in disc drives, in printers and offer them to you at — well, we wouldn't say it ourselves but our competitors might — a silly price.

The Wordprocessor is none other than the number one best seller for the BBC: WORD-WISE PLUS from Computer Concepts.

Respected opinions regard WORD-WISE PLUS as very user friendly, flexible, straightforward or simply excellent (1).

The Disk Drive is Mitsubishi's one Megabyte (unformatted) and can store up to 640 kilobytes of text on a double density single diskette.

The disk interface electronics are our 1770 based double density filing system totally compatible with the Acorn 1770 DFS and the newer ADFS.

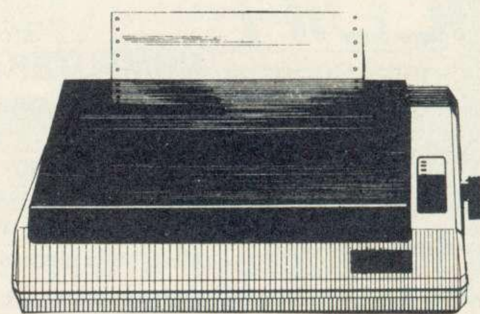
In fact, it even works with the Acorn chips. It has so many features that even experts might suspect that it's too good to be true (2).

The printer is the Solidisk PR165, has a speed of 160 cps in normal mode, is very fast in NLQ (near letter quality) mode and is Dot Matrix, bit graphic capable and Epson compatible (3).

For the icing on the cake, you also get a free Spelling Checker, Electronic Spreadsheet, Database and lots of games.

With around a quarter of the disc storage, a much slower printer, no colour and a membrane keyboard, with generally more expensive software, the AMSTRAD PCW8256 (at £399.00 + VAT) looks unconvincing.

By the way, the BBC already has more memory space than the AMSTRAD



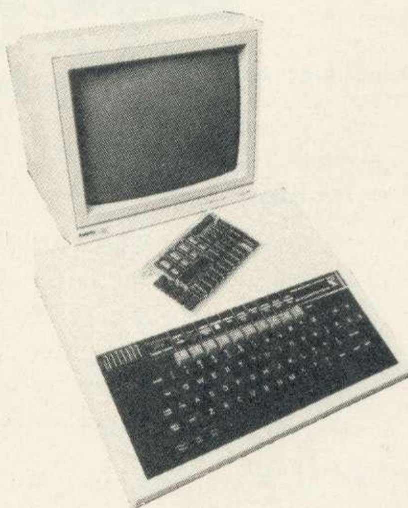
(1) See reviews in E & CM, CEEFAX, Acorn User.
(2) See reviews in Acorn User, BBC Micro User and A&B Computing.
(3) Solidisk own direct imports from Japan, subject to change without notice for improvements.

# AN ALL IN ONE

## Wordprocessing system for the BBC to make the AMSTRAD PCW8256 look greener than just green . . .



PCW8256, but if you still need more, turn over the page and look at the new Solidisk baby: up to 500K of ROMs and a cool 4 Megabytes of RAMs, enough to knock down any challenger.



**AVAILABLE FROM SOLIDISK BY DIRECT TELEPHONE OR MAIL ORDER AND FROM SELECTED BBC SPECIALISTS FOR JUST £299.00** + VAT

PLUS CARRIAGE

Wouldn't you like to order one now?
Just ring this number:
SOUTHEND (0702) 354 674
(Access/Visa)

**Wordchic**

**SOLIDISK** Office System

**SOLIDISK TECHNOLOGY LTD**
**17 Sweyne Avenue**
**Southend Essex**

The Solidisk package contains:
One 160 CPS PRINTER,
One 1 MEGABYTE DISC DRIVE,
One DOUBLE DENSITY DFS,
WORDWISE PLUS ROM,
KEYSTRIP, 4 MANUALS
5 SOFTWARE DISKETTES
1 BLANK DISKETTE.
100 SHEETS OF FANFOLD PAPER.

To: Solidisk Technology Ltd, 17 Sweyne Avenue, Southend, Essex.
Please rush me the following:
Solidisk Office System at £355 incl. VAT + courrier carr.

I enclose a cheque/postal orders for £................ or please debit my credit card account:

Mr Access ☐ Barclaycard ☐ no. is ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

NAME ........................................

ADDRESS ........................................

........................................

........................................ TEL NO: ........................................

Prices and specificatoins may change without notice. Delivery subject to availability. Please ring for details.

# The new SOLIDISK BABY up to 500K of ROMS and 4 Megabytes of RAMS



The Baby From Solidisk is setting new challenges to software writers.

It takes up to 256K of ROMs, anything from 8k to 64K chips and can control another 256K on the BBC board.

It has 256K of RAM built-in, expandable to a whacking 4 Megabytes.

It runs at full 2Mhz, at the same speed (and timing) as the BBC board RAM.

It already comes with lots of software to put some of its potential to good use, but it is still waiting for the new generation of fully integrated software to come. Like the INTER suite from Computer Concepts.

To start with: the famous Wordwise Plus ROM from Computer Concepts and Solidisk 32K superb Toolkit ROM are included in the deal.

The additional 256k RAM are divided into 8 banks of 32k bytes. They can be independently used as Shadow or Sideways RAM or BOTH. i.e. the top of each bank can be used as Shadow while the bottom is Sideways RAM.

The Size of the paged memory is programmable, up to 31K for Sideways RAM/ROM and up to 30K for Shadows. That's 61K bytes out of 64K memory space.

The SWR256 board plugs into the 6502 socket and the latter is placed back into the on board 40 pin socket. 2 wires are hooked to IC legs on the computer board. The installation requires no soldering and can be carried out by novices or experts alike.

In fact, Solidisk engineers can open your computer and install the board in around 100 seconds.

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**Prices:**
The SWR256, 2 ROMs and manuals costs £175.00 inclusive of VAT.

**Upgrades:** (incl. VAT)

From SWR32 to SWR256 ........................£129.00
From SWR64 to SWR256 ..........................£89.00
From SWR128 to SWR256 ........................£75.00

These prices include the two ROMs.

# INTEGRATED SOFTWARE?

# That will do nicely

# Solidisk introduces the

# SWR256

## SPECIAL FEATURES:

The SWR256 system has a Programmable Memory Management Unit on board, totally compatible with all well known software.

It consists of a ROM register (&FE30), a Shadow register (&FE34), an Access register (&FE32), and a Size register (&FE36).

The ROM register duplicates the one built into the BBC board. It selects one of the 16 possible ROMs.

The Shadow register is new and similar to the BBC PLUS implementation. It selects one of the 128 possible Shadows or moves a Sideways RAM into the Shadow area.

The Size register is new and not implemented anywhere else. It specifies how big you want your Shadows and your ROMs.

The normal setting is 16K for Sideways ROM/RAM and 20K for Shadows.

If bit 0 is set, your Sideways ROM or RAM is 31K (useful for Hi-language, from &8000 to &FC00).

If bit 1 is set, your Shadow is 30k (useful for language, from &800 to &8000).

Bits 2 and 3 are reserved for possible Shadow modes 3 and 7.

The built-in software in the Solidisk Super Toolkit (a 32K ROM) runs with all well known ROMs and will handle all MOS calls.

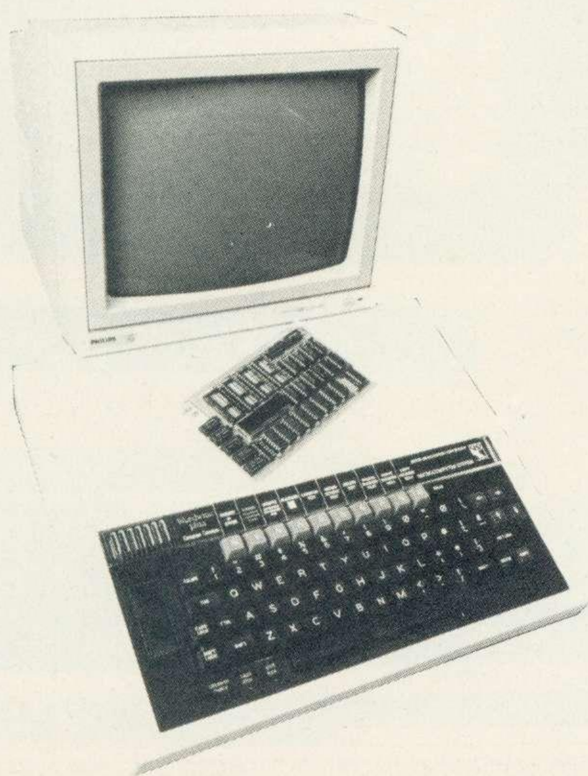
By programming the Size register, it is possible for a ROM to have 61K of continuous memory, more than you can get with the 6502 Second Processor and you will still retain the paging facility.

By programming the Shadow register, one ROM can move another ROM into the Shadow area and call routines directly there.

There is also a 16 pin expansion socket on the board for direct access to the RAM array.

In a word, the Solidisk SWR256 is the perfect partner for any serious integrated software.

The new SWR256 is available by direct telephone or mail order from Solidisk and selected BBC Specialists.



**SOLIDISK Office System**

To: Solidisk Technology Ltd 17 Sweyne Avenue Southend Essex SS2
Please rush me the following:

.......... SWR256K Ram at £175 incl. VAT and carr.

I enclose a cheque/postal orders for £ ...................... or please debit my credit card account:

My Access ☐ Barclaycard ☐ no. is ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

NAME ..........................................................................

ADDRESS ......................................................................

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Prices and specifications may change without notice. Delivery subject to availability. Please ring for details.

# SOLIDISK MITSUBISHI DISC OFFER

A Complete Disc System containing everything you need, including 1 Blank Diskette, at a new low price of only £200.00 inclusive.
The Misubishi Offer Comprises:
— One Mitsubishi MF4853, Double Sided, 80 Track Disc Drive. Cased in beige with all leads.
— One Solidisk DDFS complete Disc Upgrade with 2.0 ROM.
— One Verbatim MD525 Blank Diskette.
— One Software Pack and User Manuals.
— Full one year guarantee.

## HARDWARE:

As described earlier as shown opposite.

## THE SOFTWARE:

The software comprises 5 diskettes, formatted in 80 tracks.

**Volume 1:**
Solidisk Word Processor and Spelling checker with English dictionary. Easier than View, Wordwise or Scribe, you enter the WP by *WP filename, then start typing. What you see on the screen will be exactly printed on paper.
Most useful commands are all displayed on the top part of the screen.
It features 80 column screen throughout with direct on screen justification, automatic margins, page numbering, Wordstar like editing commands for block move, block delete, block copy, print, save, load text to cursor, insert and overwrite, search and replace, total word count, word frequency count, free space, *commands etc. Solidisk WP loads and saves texts in under 1 second flat and also you may save the edited version as many times and under any filename you like.
It has the unusual ability to spellcheck your document without leaving it, simply by typing in Control-U.
It has self dictionary generating capability too. You may create any dictionary you like by just simply entering the words.

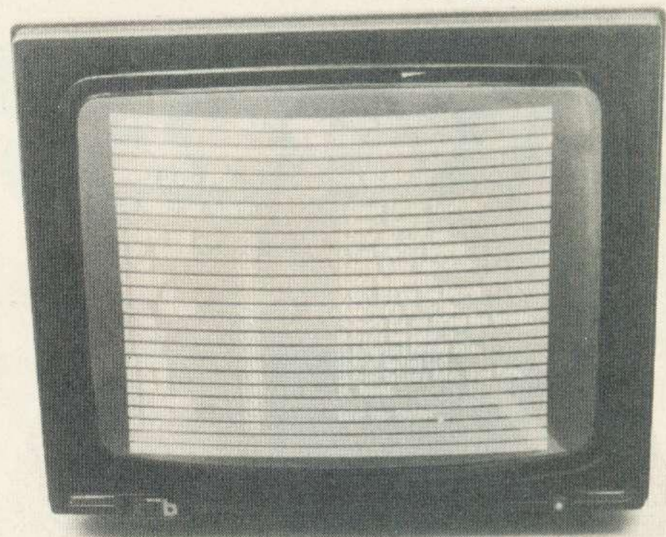
**Volume 2:**
Volume 2 contains Solidisk Database. It is a random access system, completely menu driven and easily customised to suit any particular filing need.
It features unlimited filesize and number of records, supports all maths functions and 80 column screen throughout.
It is simple to understand and to use. You take one of the 15 different options to start. Each option will then lead to a new menu and so on. Mostly you only have to enter an appropriate data or hit the RETURN key.
You can design new databases, list all records, edit them, merge them, split them, making mailshot with Solidisk WP etc. . . We use it to process all your orders.




**Volume 3:**
Volume 3 contains Solidisk Spreadsheet. Menu driven with standard options to create, edit, recalculate, print, search, sort, report generator and mailmerge.
Unlimited number of rows and columns. Each column can be as small as 2 or as big as 70 characters.
All math functions are supported. Complete with home banking and simple portfolio management.

**Volume 4:**
Volume 4 contains the Solidisk tape to disc program and a selection of computer games.

**Volume 5:**
Volume 5 contains MBASIC, SIGEN and other disc utilities.



## IMPORTANT:

If you upgrade to a twin Mitsubishi disc system, Solidisk will offer you, subject to stock availability, a completely free set of CPU and keyboard case as shown earlier.

You should return your disc drive with payment for another Mitsubishi MF4853 (£160.00) or alternatively, save by ordering right now a Fantastic Offer at only £340.00.

The keyboard is 12 mm lower than the normal BBC case, 2-3 degrees more angled, weighs only 5lbs, does not skid about on the desk while enjoying 2 feet of freedom from the computer unit — and makes a lot of difference to typists (even 2 fingered ones!)

The CPU accommodates 2 disk drives and withstands any heavy weight monitor while providing easy attachment for the whole system, CPU and disk drives, to the desk if need be. Good ventilation to the power supply too and hides all untiday cables away.



## PRICE

The complete CPU and keyboard case costs £30.00 inclusive + £3.00 post and packing. The system could be yours free as part of the Mitsubishi twin discs offer.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

# ADVANCED FILING

## SOLIDISK 1770 DISC INTERFACE
### For the BBC Computer

The Solidisk Double Density 1770 Disc Interface enables the standard BBC B computer to use most current types of disk drive. Only 4 components need to be fitted into existing sockets on the computer and this can be done in a few minutes by novice and expert alike. It now can run all Acornsoft games (such as Elite, Aviator, Revs, Magic Mushroom etc. . . .) and most other protected discs (Castles Quest, Island's Music System etc. . . .)

The Disk filing System provides every facility that you would expect such as built-in disc formatter and verifier, automatic 40/80 track switching, programmable disc speed and is upgradable to the Solidisk ADFS.

It also has some significant advantages over the Acorn 1770 system, mainly:

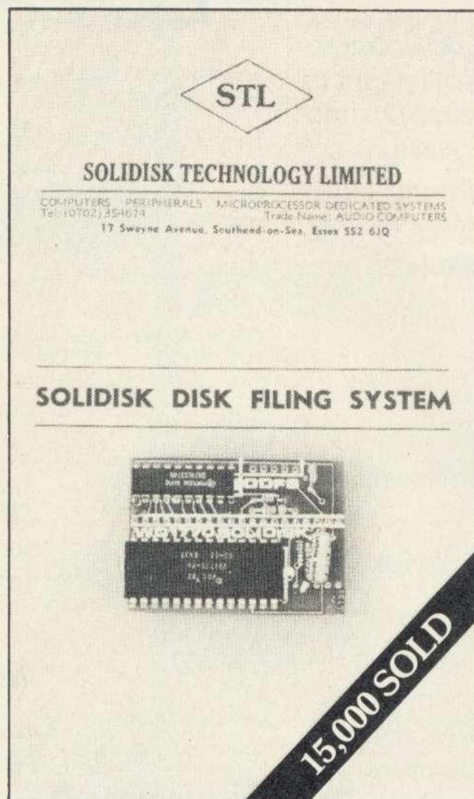
1) 60% more storage capacity in double density DFS, giving you up to 640k on a double sided 80 track diskette as opposed to only 400k bytes with the Acorn 1770.

2) Better emulation of the 8271: some protected discs (such as the early Acornsoft's Elite game) would not run on the Acorn 1770.

3) Built-in useful disk utilities such as TAPEDISC, MZAP, DZAP (disc sector editor), RECOVER, RESTORE etc. . . . which would add to cost if bought separately.

### PRICE:

The 1770 Double Density Disc Interface costs £45.00 inclusive of VAT, DFS 2.0 ROM, manual and 1 year guarantee.
If you wish, you can also order it with the ADFS ROM and the total cost is £55.00 inclusive.




## SOLIDISK ADVANCED DISC FILING SYSTEM
### for the BBC Computer

The Advanced Disc filing System (ADFS) is now officially endorsed by Acorn and is certainly going to revolutionise software for the BBC Micro.
The Solidisk ADFS, reviewed in A&B Computing 85, whilst comparable to Acorn's ADFS, is very much designed with floppy disk and DFS software compatibility in mind.
The Solidisk ADFS will run most software available for the BBC computer, including all Acorn languages and the View family, Computer Concepts Wordwise and the INTER family, Gemini's Datagem etc. . . .
It also has PAGE at the lowest value, eg &1900 with one channel. It can realistically support up to 10 opened channels without slowing down the program as it does not swap buffer pages to disc.
It also has utilities such as *FORM, *VERIFY, *BACKUP etc not found in the Acorn ADFS ROM.
It is also very responsive and double safe, with automatic head settling and read after write automatic error correction.
It runs with all Acorn second processors including the latest 32016 mainframe machine (only Z80 CP/M requires new MFM BIOS) and it is fully supported by the Solidisk Toolkit ROM.
The Solidisk ADFS is available for the BBC B or PLUS fitted with the Solidisk 1770 Disc Interface or the Acorn 1770 as a TWO ROM chip set, consisting of the DFS 2.1 and the ADFS 2.1. A 32k ROM may be supplied in lieu of the 2 ROMs on request. It costs £20.00 when purchased separately like this.

## SOLIDISK 1770 + 8271 Disc Interface
### For the BBC Computer

As Acorn are now backing the Advanced Disc Filing System, many of you, having got the 8271 Disc Interface, wonder what you are going to do next.

If you get the Acorn 1770 upgrade, you will have to part with your 8271 and possibly a few expensive pieces of software such as the old Elite or Replica II which won't run without the 8271. It is still only a single density DFS.

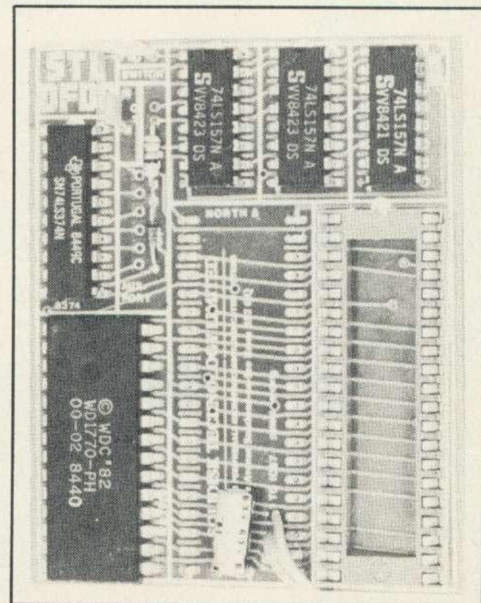
The alternative is to get the Solidisk 1770 + 8271 Disc Interface (known as the DFDC, acronym for Dual Floppy Disc Controller) which will let you keep the 8271 which you already have and add 1770 Double Density capability.

It is low cost, tiday and easy to fit.

At a flick of a switch, you can select either the 8271 or the 1770 Floppy Disc Controller.

You will have the best of both worlds: compatibility with the 8271 and fascination with the 1770 ADFS.

It is probably the fastest, more powerful and versatile Disc System for the BBC.
The DFDC costs £60.00 including VAT, manual, DFS 2.0 ROM and ADFS 2.1 ROM.



SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

## ACORN COMPUTER SYSTEMS

| | |
|---|---|
| BBC B PLUS with DFS | £369 (a) |
| BBC B PLUS with 128K | £415 (a) |
| BBC B PLUS Econet (No DFS) | £370 (a) |
| BBC B PLUS Econet & DFS | £420 (a) |
| BBC Model B + DFS | £360 (a) |
| BBC Model B + Econet | £335 (a) |
| BBC Model B + Econet + DFS | £399 (a) |
| BBC Dust Cover | £4.50 (d) |

## UPGRADE KITS

Acorn DFS Kit............£80 (d) 1.2 OS ROM............£7.50 (d)
Econet Kit..................£55 (d) DNFS ROM............£17.50 (d)
BASIC II ROM with User Guide..............£22.50 (d)
**1770 DFS Upgrade for Model B..............£43.50 (d)**

ADFS is Acorn's long awaited double density disc interface system. The hierarchical filing system on the ADFS allows almost unlimited number of files. Treating a double sided disc drive as one drive allows storage of much larger files and greatly enhances the storage efficiency. Will read 40T discs on 80T drives.

**ADFS ROM (for B with 1770 DFS & B plus)......................£26 (d)**

## ECONET ACCESSORIES

Econet Starter Kit.........£85 (b)
Econet Socket Set..........£34 (c) Printer Server Rom.......£41 (d)
File Server Level I.........£75 (d) 10 Station Lead set........£26 (c)
File Server Level II......£210 (d) Adv. Econet User Guide.£10 (d)

## BITSTICK CAD PACKAGE

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 48 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value.

**BITSTICK I** £305 (a)
**ROBOCOM BITSTICK II:** This bitstick comes with Bitstick I software upgraded to allow for auto dimensioning, scaling £775 (a)
**Upgrade for Bitstick I to II** £450 (b)
**ACORN's multiplotter driver** for Bitstick graphics (All popular plotters included) £79 (c)
Epson FX80 screen dump routine for Bit Stick I £35 (d)
Epson FX80 dump for Bitstick II £39 (d)

## ACORN WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III can be installed on the Hard Disc before delivery.

**10 Mbyte Winchester Drive** £1350 (a)
**30 Mbyte Winchester Drive** £1950 (a)
File Server Level III already installed.

## ACORN 2nd PROCESSORS

**The Z80 2nd Processor** converts your BBC into a CP/M business computer. Complete with comprehensive free software. £299 (a)

**The 6502 2nd Processor** provides both an increase in speed and memory. £169 (a)

## TORCH PRODUCTS

**ZEP100** Z80 Card with PERFECT Software + Z80 Basic...£275 (a)
**ZDP240** ZEP100 + TORCH Disc Pack..........................£525 (a)
**HDP240** ZEP100 + 20Mb Hard Disc + 1 × 400K floppy.£2150 (a)
**UNICORN 68000** 68000CPU + 512K RAM + UNIX OS + HDP240 with Z80B CPU..........................................£3450 (a)

## TECHNOMATIC XMAS BARGAINS

**Look out for the special symbols on all our pages or phone**
**TECHNO-LINE Viewdata**
**01-450 9764**
**24 hours, 7 days a week**
**(1200/75 Baud-Prestel type protocols)**

## EPROMs/RAMS

**2764-25.......£2.00 (d) 27128-25.....£3.00 (d)**
**6264LP-15.........£4.00 (d)**

## ACORN 32016 CO-PROCESSOR

Acorn Cambridge Co-processor combines with the BBC micro to provide full 32 bit processing. The National Semiconductor 32016 processor performs all language and application processing, the NS32081 floating point processor maximises the performance and provides support for IEEE standard fp handling.

The specially developed operating system PANOS, provides efficient interfacing between the languages and the hardware and software of the BBC micro incl. the variety of ACORN filing systems: DFS, ADFS and NFS. PANOS provides a variety of utilities including a full screen editor and a linker providing acces to both library routines and cross language linking.

FORTRAN 77, PASCAL and C languages with mainframe type implementations, fully compiled and provided with appropriate library support are included. Other languages include, Cambridge LISP with its compiler, a 32016 assembler and a 32bit interpreted implementation of BBC BASIC with full screen editor. 1 Mbyte of RAM is included as standard.

**32016 CO PROCESSOR (Currently available from stock) £1399 (a)**
***Please phone or write for full specifications on the Cambridge Co-processor and Cambridge Workstation.***

## MULTI-FORM Z80 2nd PROCESSOR

MULTIFORM is a second processor with a difference! It is capable of running virtually all CP/M-2.2 based software in almost any format on a 5.25" disc system. It will operate with single or dual, 40 or 80 track single or double sided drives and with Acorn single and double density DFS.

The second processor package is supplied with a 64K ram card, OS/M operating system in rom and a utility disc. The utility disc contains terminal emulations for the two most popular CP/M formats, a library with a variety of CP/M format configurations and a program for creating new configurations. It is mains powered and interfaces with the BBC through the 1MHz bus.

On a dual drive system, two separate CP/M formats can be run simultaneously, making data exchange between two CP/M formats simple.

MULTIFORM is an indispensable tool for any establishment that operates a variety of CP/M format machines, or for anyone who holds a library of CP/M packages or anyone contemplating converting his BBC micro into a CP/M machine and wishes a total freedom in purchasing the software packages.

**MULTIFORM Z80** £299 (a)
***(please specify the type of DFS in use)***

## META-ASSEMBLER

Both an editor and Macro-Assembler. Meta can assemble most 65xx, 68xx, 6804, 6805/6305, 6809, 8048, 8080/8085, Z80, 1802 and more. (Free updates due very soon — 68000 series, 8088/8086, Z8000 etc.) Many advanced features including Macros, conditional assembly, Global/selective search etc etc. Includes 16K Eprom, disc, function key card, and comprehensive manual. Please phone for comprehensive leaflet.. **Meta-Assembler £126 (c)**

## MUSIC 500/SYMPHONY

Acorn's MUSIC 500 is a sophisticated music composition aid and sound effects generator. Phone for leaflet. **Music 500 £160 (b)**
SYMPHONY KEYBOARD from ATPL is a professional 4 Octave keyboard with sophisticated software. **Symphony Keyboard £86 (a)**
Synth-500 disc allows its use with Music-500 **Synth-500 Disc £8 (d)**

# TECHNOMATIC

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**TECHNOLINE**
24 hour Viewdata Service 01-450 9764

Orders welcome from government depts & educational establishments.

**All prices ex VAT**
**Prices are subject to change without notice**

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

#  PRINTERS 

**ALL PRINTERS HAVE A 12 MONTH GUARANTEE**

**EPSON DOT MATRIX PRINTERS:** EPSON — the high quality range of dot-matrix printers that set the standard in the industry. A wide range of interfaces ensure that these top-of-the-range printers can be used with most computers.

RX 80T **£169 (a)** RX 100 **£305 (a)**
FX80 (std) **£245 (a)** FX80+ **£279 (a)**

NEW FX105 (NLQ facility) **£449 (a)**

**Epson LX-80 NLQ:** A new low-cost high performance dot matrix printer from Epson. Its many features include Near Letter Quality, Draft mode, programmable characters, a variety of print styles, graphics etc. Supplied with friction feed.

LX-80 **£195 (a)** Optional Tractor Feed **£20 (c)**

**Epson JX80 Colour** A full colour dot matrix printer with colour text and graphics as well as many advanced printer features.

JX80 4 Colour **£435 (a)**

**KAGA NLQ PRINTERS**
A top quality yet very competitively priced printer with a Near Letter Quality mode. Includes all the features of Epson FX and uses the same control codes. Extra socket provided on the pcb for installing either 8K RAM or 8K EPROM for custom made font.

KP810 (80 col) **£215 (a)** KP910 (156 col) **£310 (a)**

**SEIKOSHA SP-10000**
A low cost attractively packaged printer includes many novel features including NEAR LETTER QUALITY mode and automatic single sheet loading. Variety of fonts, 100 cps, both friction and tractor as standard.

Seikosha SP-1000 **£159 (b)**

**CENTRONICS GREAT LITTLE PRINTER:** A new compact printer from Centronics featuring full Epson compatability, NLQ mode, a variety of fonts, graphics, and both centronics and serial interfaces fitted as standard. Friction feed as standard. **GLP £99 (b)** **Tractor Feed £15 (c)**

## BUFFALO 32K Buffer for EPSON PRINTERS

This compact 32K buffer can be fitted internally on any EPSON printer within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions.
**Buffalo 32K Buffer £75 (d)**

## DAISY WHEEL

**BROTHER HR15:** * 14 cps * 3K Buffer * Two colour printing * Proportional spacing * Underline * Bold * Shadow print * Super/Sub script + many other features.

BROTHER HR15 **£285 (a)**

**JUKI 6100:** * 15 cps * 2K Buffer * Switchable 10/12/15 cpi * Proportional printing * Linear Motor for max reliability.

JUKI 6100 **£279 (a)**

## PERIPHERAL & COMPUTER SHARERS

We now offer an extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

| | Parallel | Serial |
|---|---|---|
| 3 Computers to a Printer | 36V36-3 £69 (c) | 25V25-3 £64 (c) |
| 4 Computers to a Printer | 36V36-4 £85 (c) | 25V25-4 £74 (c) |
| 2 Computers/2 Printers x-over | 36V36-X £69 (c) | 25V25-X £69 (c) |
| BBC Cable Set 3 to 1 (1m ea.) | £32 (c) | £34 (c) |
| BBC Cable Set 4 to 1 (1m ea.) | £39 (c) | £41 (c) |

**Computer Sharer:**
1 computer to 2 printers fitted with Cable for BBC TCS26 £19.50 (c)

## GRAPHICS PLOTTER

Basic 3 colour flat bed plotter £270 (a)
Opto Sensor £78 (d) Drill Router £79 (c)
**Basic Plotter can be powered from BBC psu**
External 12V psu £41 (c) External 12V psu (for drill router) £78 (c)

## PRINTER ACCESSORIES

**EPSON**
FX80 plus sheet feeder £129 (b);
LX80 sheet feeder £49 (b)
Paper Roll Holder £17 (d)
FX80 Tractor Attachment £37 (c)

Interfaces:
8143 RS232 £28 (c);
8148 RS232 + 2K £57 (c);
8132 Apple 11 £60 (c);
8165 IEEE + Cable £65 (c).
Serial & Parallel Interfaces with larger buffers available.

Ribbons: RX/FX/MX80 £5.00 (d);
RX/FX/MX 100 £10 (d);
LX80 £6 (d)
Spare pens for HI80 £7.50/set (d)

**KAGA TAXAN:** RS 232 Interface + 2K buffer £78 (c);
Ribbon KP810/910 £6 (d)

**JUKI:** RS232 Interface £65 (c);
Spare Daisy Wheel £14 (d);
Ribbon £2.50 (d);
Sheet Feeder £182 (a)
Tractor Feed Attach £129 (a)

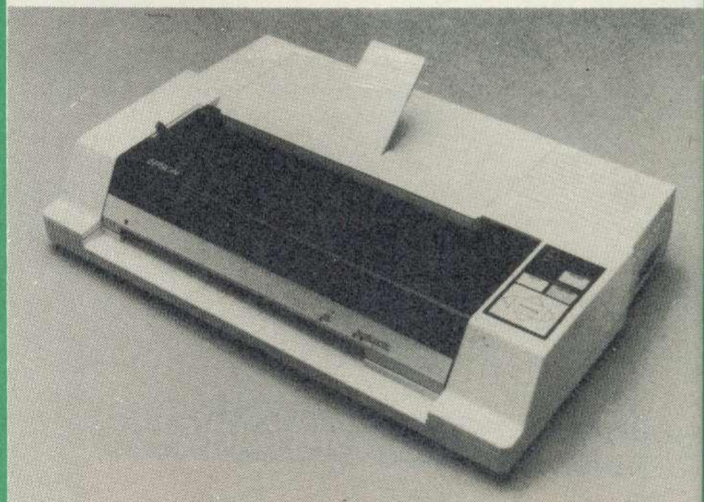
**BROTHER HR15:** Sheet Feeder £189 (a) Tractor Feed £99 (a)
Ribbons Carbon or Nylon £4.50 (d);
Red Correction Ribbon £2 (d)

**BBC Printer Lead:**
Parallel (42") £7 (d); Serial £7 (d)
Printer Leads can be supplied to any other length.

**Plain Fanfold Paper with extra fine perforation (Clean Edge):**
2000 Sheets 9.5" × 11" £13 (b) 2000 sheets 14.5" × 11" £18.50 (b)
Labels per 1000s: Single Row 3½" × 1 17/16" £5.25 (d)
Triple Row 2-7/16" × 1 7/16" £5.00 (d)
**Dust Covers:** FX80 £5.50 (d), FX100 £7.50 (d), Kaga KP810 £6 (d), KP910 £7 (D)

## EPSON HI-80 PLOTTER

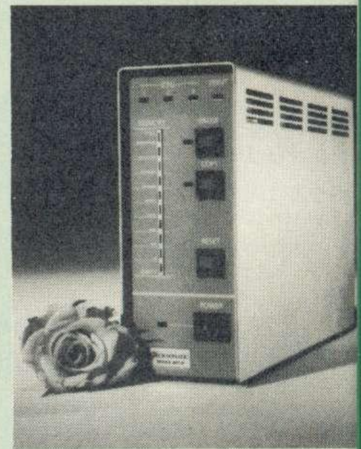
EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer. Detailed leaflet on request. **Epson Hi-80 Plotter £345 (a)**



## PRINTER SHARER/BUFFER

A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.



TSB 64 Buffer/Sharer **£199 (a)**
BBC Cable Set **£30**

## MONITORS

**All monitors supplied with BBC lead**

### MICROVITEC

All 14" monitors now available in plastic or metal cases, please specify your requirement.

| 14" RGB | | 14" RGB with PAL & Audio | |
|---|---|---|---|
| **1431** Std Res | £185 (a) | **1431** AP Std Res | £199 (a) |
| **1451** Med Res | £225 (a) | **1451** AP Med Res | £275 (a) |
| **1441** Hi Res | £385 (a) | These monitors can receive TV programs thru a Video Recorder | |

Swivel Base for Plastic 14" Microvitecs **£20 (c)**

**20" RGB with PAL & Audio**
**2030CS** Std Res **£380 (a)** **2040CS** Hi Res **£685 (a)**

### KAGA TAXAN 12" RGB

**VISION II** Hi Res **£225 (a)** **VISION III** Plus **£330 (a)**

**SUPERVISION III Plus** **£330 (a)**

**MITSUBISHI** 14" RGB Med RES IBM & BBC Compatible **£229 (a)**

### MONOCHROME MONITORS:

| | |
|---|---|
| **SANYO DM8112CX** Hi Res 12" Green Screen | £86 (a) |
| **KAGA KX1201G** Hi Res 12" Etched Green Screen | £92 (a) |
| **KAGA KX1203A** Hi Res 12" Etched Amber screen | £105 (a) |
| **PHILIPS BM7502** 12" Hi Res Green Screen | £75 (a) |
| **PHILIPS BM7522** 12" Hi Res Amber Screen | £79 (a) |
| Swivel Base for Kaga Monochrome fitted with Digital Clock | £21 (c) |
| Monitor Plinth for the BBC | £9.75 (b) |
| Double Tier Plinth for BBC and flat pack dual drive | £19.50 (b) |

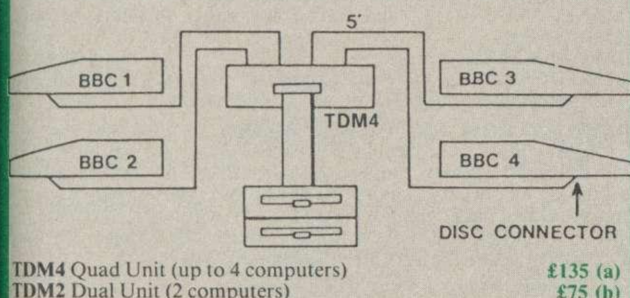
BBC Leads Kaga RGB **£5(d)** Microvitec **£3.50 (d)**
Monochrome **£3.50 (d)**
**Multi Output Video Adaptor:** Allows up to 4 RGB Monitors to be connected to the BBC. Fully buffered **£48 (d)**

## TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software. **Touchtec 501 £260 (b)**

## DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.




**TDM4** Quad Unit (up to 4 computers) **£135 (a)**
**TDM2** Dual Unit (2 computers) **£75 (b)**

## DISC ACCESSORIES

Single Disc Cable **£6 (d)** Dual Disc Cable **£8.50 (d)**
**DISC STORAGE CASES**
10 Disc Library Case **£1.80 (d)** 30 Disc Case **£6.00 (c)**
10 × 3½ Disc Box **£3.50 (d)**
**LOCKABLE CASES**
40 Discs **£14 (c)** 70 Discs **£15 (c)** 100 Discs **£16 (c)**

## DISC DRIVES



**Your computer installation can look like this with our PD800P drive**

This highly successful drive offers unique features:

New slimline Mitsubishi mechanisms with ultra low power consumption (only 8 watts per mechanism), front locking lever and capable of single or double density operation. Ultra fast track access times and head settling times.

40/80 switchable with switches located on the front panel. A generously rated switch-mode power supply ensures reliability with minimum heat dissipation for long periods of operation.

The mechanisms are set inside a sturdy monitor stand painted in 'BBC-matching' beige. Its 'looks' are enhanced by its black front panel, with attractive enamel-white markings.

These disc drives with a built-in monitor plinth provide a compact installation and give a professional look to the system.

As with all standard TECHNOMATIC drives it comes complete with a data cable, a mains lead with a suitably fused 13A moulded plug, manual and a formatting disc.

### PD800P 2 × 400K drive £260 (a)

Our other TECHNOMATIC drives are housed in smart metal casings painted with BBC beige colour and are supplied complete with data and power cables ready for connection to the computer. Drives with mains power supply are fitted with a mains lead and a suitably fused 13A moulded plug.

All 80T drives are fitted with the new model Mitsubishi mechanisms and are supplied with 40/80T switches as standard and at no extra cost.

**Single Drives:**
1 × 100K 40T SS : **TS100 £69(b)** **PS100 with psu £89 (b)**
1 × 400K 40/80T DS : **TS400 £99 (b)** **PS400 with psu £120**

**Dual Drives:** (with integral psu) Stacked Versions:
**PD200** 2 × 100K 40T SS **£195 (a)**
**PD800** 2×400K 40/80T DS **£199 (a)**

**3.5" Drives:**
These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives come complete with cables, manual and formatting disc.

**TS35** 1 × 400K 80T DS **£99 (b)** **TD35** 2 × 400K 80T DS **£172 (b)**

## 3M FLOPPY DISCS

**Authorised Distributor Data Recording Products** **3M**

Industry standard high quality discs with guaranteed error free performance for life. Discs in packs of 10:

5¼" DISCS
40 T SS DD £13 (d) 40 T DS DD £18 (d)
80 T SS DD £22 (d) 80 T DS DD £24 (d)

3½" DISCS
80 T SS DD £30 (d)
80 T DS DD £38 (d)



**20% off the price for every pack purchased with a drive**

## DRIVEHEAD CLEANING KIT

The **FLOPPICLENE** drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits.
**Floppiclene with 20 disposable cleaning kits.** **£14.50 (b)**

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**Prices are subject to change without notice**

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.



## COMMUNICATIONS



**MINOR MIRACLES WS2000** A world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. **WS2000** **£115 (c)** BBC Serial Cable **£7.**

**WS2000 Auto-Dial card:** includes an integral loudspeaker for monitoring of the phone line **£30 (d).**
BBC User Port cable (for modem control) **£4.**

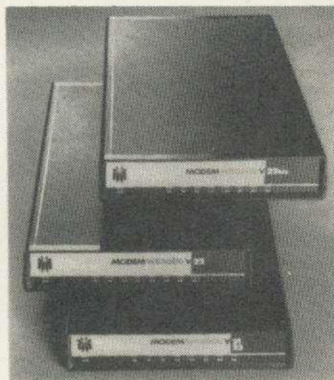
**SKI KIT** (Allowing total control of the modem by your computer) **£10.**

**DS1 Disc (for Commstar):** When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling **£10.**

**WS2000 Auto-Answer Card £30(d).**
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

**DATA-BEEB** An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. **£22 (d)**

**NEW WS-3000 RANGE** — the new professional series. All are intelligent and 'Hayes' compatible, allowing simply 'English' commands to control its many features. All models feature Auto-Dial with 10 number memory, Auto-Answer, Speed Buffering, printer port, data security option etc. All models are factory upgradeable.



**WS3000 V2123** (V21 & V23 + Bell) **£295 (a)**

**WS3000 V22** (as above plus 1200 baud full duplex) **£495 (a)**

**WS3000 V22bis** (as above plus 2400 baud full duplex) **£650 (a)**

The WS3000 range all have BT approval.

**CONNECT-3000** AN ESSENTIAL UTILITY FOR THE WS3000 OWNER — a dedicated control package specially written to optimise the potential of the WS3000 series of modems. It provides a friendly menu-driven 'front-end', for the superb but rather complex multitude of facilities of the 3000 — no need to remember register nos. or complex command codings etc. It provides easy control for Prestel, Terminal, Auto-Answer/Dial use, while a unique 'default' facility provides automatic, pre-defined screen presentation. Works in conjunction with ALL communication software, including Commstar, Data-Beeb, Termulator, Termi, Communicator etc.
**40/80 Disc £16.50 (d)** **ROM £19.50 (d)**

**BUZZ BOX** This pocket sized BT approved modem complies with V21 300/300 baud and provides an ideal solution for communications between users, with mainframe computers and bulletin boards. Suitable for use with Open University computer. Battery/mains powered.
**Buzz Box** **£55 (c)** Mains Adaptor **£10 (d)** BBC Data Lead **£8 (d)**

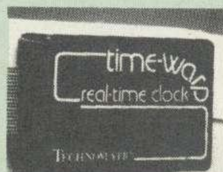
**COMMSTAR** An ideal communications rom for both Prestel and bulletin boards. Facilities include Xmodem, clock etc. **£20 (d)**

**TERMULATOR** An advanced terminal emulator on a 16K Rom. Emulations include VT52/100, Tektronix 4010 etc. Allows a BBC to be used as a terminal for almost any mainframe computer or computer network. **£25 (d)**

**COMMUNICATOR** This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£49 (d)**

## REAL-TIME CLOCK CALENDER

A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as extensive software including a simple demonstration diary/planner application program on disc. **£25 (c)**




## EPROMER II




A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.
Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

* Integral power supply ensures no power drain from the computer.
* Interfaces through 1 MHz bus, fully buffered.
* Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
* Eproms upto 16K (27128) programmed in single pass.
* Selectable programming voltage 25/21/12.5V
* Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
* User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
* Full screen editor with HEX/ASCII input.
* Data input from keyboard/Tape/Disc/Eprom.
* Software interface for integration of user's special requirements.
* Constant display of all options selected.
* Several BBC BASIC programs can be entered on a single eprom.
* Checksum facility allows for easy identification of programmed roms.
* Enter OS Commands from within the epromer program.

**EPROMER II** with Manual & Software on disc **£99 (b)**
ROM based software **£10**

## UV ERASERS

**UV1T** Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. **£59 (b)**

**UV1B** as above but without the timer. **£47 (b)**

## ROM/RAM EXPANSION SYSTEMS



**ARIES B-32 BOARD:** Features 32K of RAM and a 16K ROM socket. RAM can be configured as 20K or 16K as shadow RAM and 12K or 16K or 32K sideways RAM. New commands include comprehensive sideways ROM/RAM management system, simplified direct access to screen RAM and the ability to move/swap the contents of any area of memory. ROM/RAM management system allows RAM allocation, list ROMs, load sideways RAM, disable ROMs, and extend any buffer including printer buffer.
**AIRES B32** RAM BOARD **£80 (d)**
**ARIES B12** ROM BOARD **£40 (d)**
**ARIES B12C** Adaptor Board for B12 **£7.50 (d)**

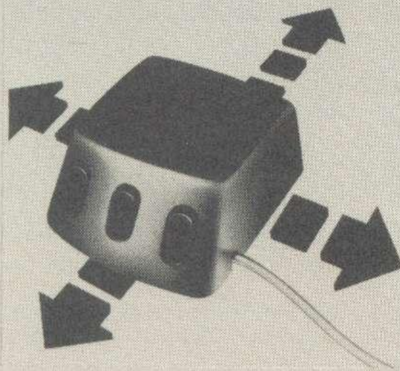
**ATPL SIDEWISE ROM EXPANSION BOARD** A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sideways rom expansion to 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board **£32 (d)** Battery Backup Kit **£18 (d).**

**ATPL Board for BBC PLUS** 10 × 16K ROMs **£29 (d)**

**COMPUTER VILLAGE** CV-16 Rom Board **£38 (d)**

**RAMROM-15** The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. No soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. Battery back-up fitted as standard. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. **£71 (b)**

## AMX MOUSE with SUPERART



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# HINTS & TIPS

**Martin Phillips addresses the perennial problems with printers, shows how to get more sound from the model B and presents a date calculator**

## PRINTERS: HELP US TO HELP YOU

Many readers have written in asking for help with their printers. The problems seem to be either translating the manual into comprehensible English, or printer incompatibility.

The first of these has been covered in some detail in Hints and Tips and other articles, and it only remains here to point out that LPRINT is Microsoft Basic (as opposed to BBC Basic) and means 'send this line to the printer'. The BBC Basic equivalent is the normal PRINT command, with the printer switched on at the start (VDU2, CTRL-B or PRINT CHR$(2)) and switched off at the end (VDU3, CTRL-C or PRINT CHR$(3)). See page 139 of this issue for a comparison of the two Basics.

The problem of printer incompatibility is much more difficult. There is no such thing as an Epson-compatible printer – what does 'Epson-compatible' mean when Epson itself keeps altering and extending the list of commands as each new printer emerges?

The first thing to assume is that the printer offered as Epson-compatible will be almost compatible, but not quite. The problems will show themselves when using programs like wordprocessor printer drivers or screen dumps. The solution is not to buy some obscure make of printer claiming compatibility, but to stick to one of the recognised well-known makes.

How do you know if a printer is well-known? Don't rely on the local dealer as he will sell what he can make most profit on, or what will appear to give the customer best value for money or even the unpopular model he has in stock and now wants to get rid of because he has cash-flow problems. Instead, buy a few magazines. Look in the advertisements to see how often particular makes are advertised, and then check through the articles to see which printers are mentioned in them (although useful, you should discount reviews for this). Look at the length of time a printer has been advertised for and also if anyone can supply printer ribbons and how much they cost.

If the XYZ printer that you have your eye on is never mentioned, you must expect to have to go it alone with little support. Look, too, at the supporting software offered. Is there a screen dump program specifically mentioned by name available for your printer? I bought an Epson JX80 colour printer and have had to wait a year for a colour screen dump so that I can get the best out of the machine. Finally, be prepared to pay a little more for your printer to get a recognised make – it is seldom money wasted if you can make better use of it.

What if you have already bought a printer and it is not compatible? It will be necessary to compare the Epson codes with those of your own printer: this is a job, though, that could easily take a couple of evenings work to check fully. In December 1984's Hints and Tips I published a full list of the Epson MX80, RX80 and FX80 control codes. I have reprinted the RX80 codes again here so that they can be used for comparison (see figure 1).

Do check your printer very carefully, however, as some of the changes are very slight but can have a profound effect. For instance, the Smith-Corona D100 printer is advertised as being 'Epson-compatible'. There are two small differences. The first is code 27,51,n (ESC 3) which sets line spacing to n/216 inches on the Epson (1/3rd of a dot), but on the Smith-Corona D100 this code sets line spacing to n/144 of an inch (1/2 of a dot). (On the Smith-Corona D200, there is a dip switch setting to enable this command to be set to either n/144 or n/216.) So, when using an Epson screen dump on the Smith-Corona, blank lines may appear in the printout. This can be avoided by changing the dump routine to use code 27,65 (ESC A). This is actually a better code to use as the n/216 line spacing is not reliable in operation, and can leave thin blank or overprinted lines across the screen dump where the paper has not been moved up accurately. The second difference is similar: the reverse feed has a larger amount of movement on the Smith-Corona than on the Epson. Here, however, the Epson RX80 does not have reverse feed, but the Epson LX80 and Epson FX80 do.

| DESCRIPTION | CODE | DETAIL | PAGE |
|---|---|---|---|
| Backspace | 8 | backspace one place | 3.25 |
| Bell | 7 | sounds bell | 3.50 |
| Bit image | | | |
| normal density | 27,75,.... | following data printed as bit images | 3.57 |
| dual density | 27,76,.... | following data printed as bit images | 3.63 |
| d.d. double speed | 27,89,.... | as above but faster and no adjacent dots | 3.66 |
| quadruple density | 27,90,.... | as above but darker | 3.66 |
| Carriage return | 13 | carriage return | 3.5 |
| Condensed mode on | 15 | stored and subsequent data printed condensed | 3.14 |
| on | 27,15 | as above | 3.17 |
| off | 18 | cancels above | 3.16 |
| Delete | 127 | deletes previous char. in print buffer | 3.49 |
| Double strike set | 27,71 | sets double strike mode | 3.21 |
| cancel | 27,72 | cancels above | 3.21 |
| Elite mode set | 27,77 | following data printed in elite size | 3.9 |
| cancel | 27,80 | cancels above i.e. returns to normal print | 3.10 |
| Emphasized mode set | 27,69 | all following data printed in emphasized mode | 3.19 |
| cancel | 27,70 | cancels above | 3.20 |
| End of paper on | 27,57 | selects end of paper detector | 3.51 |
| off | 27,56 | deselects end of paper detector | 3.51 |
| Enlarged mode set | 14 | enlarged for one line | 3.11 |
| set | 27,14 | as above | 3.17 |
| set | 27,87,n | n=1/49 all following data printed enlarged n=0/48 cancels | 3.13 |
| cancel | 20 | cancels that set by 14 | 3.12 |
| Form feed | 12 | executes form feed | 3.8 |
| length lines | 27,67,n | sets form length as n lines | 3.43 |
| length inches | 27,67,0,n | sets form length as n inches | 3.43 |
| Half speed | 27,115,n | n=1,49sets half speed print n=0,48 cancels | 3.55 |
| Indent | 27,108,n | sets n character left margin | 3.47 |
| Initialise | 27,64 | initialises printer | 3.53 |
| International set | 27,82,n | prints following data from n character set | 3.29 |
| Italics on | 27,52 | prints all following data in italics | 3.26 |
| off | 27,53 | cancels above | 3.26 |
| Line feed forward | 10 | executes line feed | 3.6 |
| Margin set | 27,108,n | sets n character left margin | 3.47 |
| Page width | 27,81,n | sets page width to n characters | 3.46 |
| Paper feed | 27,74,n | executes an n/216" paper feed (0<=n<=255) | 3.7 |
| Re-set | 27,64 | initialises printer, including clearing buffer | 3.53 |
| Skip over perforation | 27,78,n | skips n lines at page bottom | 3.44 |
| cancel | 27,79 | cancels above | 3.45 |
| Slow speed | 27,115,n | n=1,49sets half speed print n=0,48 cancels | 3.55 |
| Spacing 1/8" | 27,48 | sets subsequent line spacing to 1/8" | 3.32 |
| 7/72" | 27,49 | sets subsequent line spacing to 7/72" | 3.33 |
| 1/6" | 27,50 | sets subsequent line spacing to 1/6" | 3.34 |
| n/216" | 27,51,n | sets subsequent line spacing to n/216" | 3.35 |
| n/72" | 27,65,n | sets subsequent line spacing to n/72" i.e. dots width | 3.36 |
| Subscript set | 27,83,n | n=1/49sets subscript mode | 3.22 |
| cancel | 27,84 | cancels above | 3.24 |
| Superscript set | 27,83,n | n=0/48 sets superscript | 3.22 |
| cancel | 27,84 | cancels above | 3.24 |
| Tab horizontal | 9 | executes horizontal tab | 3.37 |
| vertical | 11 | executes vertical tab | 3.38 |
| Underline | 27,45,n | n=1/49selects underline, n=0/48 deselects underline | 3.18 |
| Unidirectional print | 27,60 | prints from left to right for single line | 3.52 |
| | 27,85,n | n=1/49 sets unidirectional print n=0/48 sets bidirectional print | 3.54 |

**Figure 1. Epson RX80 control codes**

Next, check all the characters against those of the Epson. The £ sign is a usual offender here, and its value should be noted. To simplify the task, first set the printer to the English character set and then type in listing 1 to print out the codes on your printer and compare them with the sample set given here



**Star printers: Epson-compatible?**

for the Epson RX80. I shall assume this printer is 'standard'. All the program does is to print out the ASCII code numbers (see July '85 Hints and Tips for an article on ASCII codes). Codes 0 to 31 and 128 to 159 are the control codes and will do odd things to the printer, so these cannot be allowed to be sent to the printer: instead the word 'code' is printed. Codes 127 and 254 are the delete code and here 'del' is printed. Last, code 12 is sent. This ensures that the last line is printed out, and the paper will feed to the end of a page.

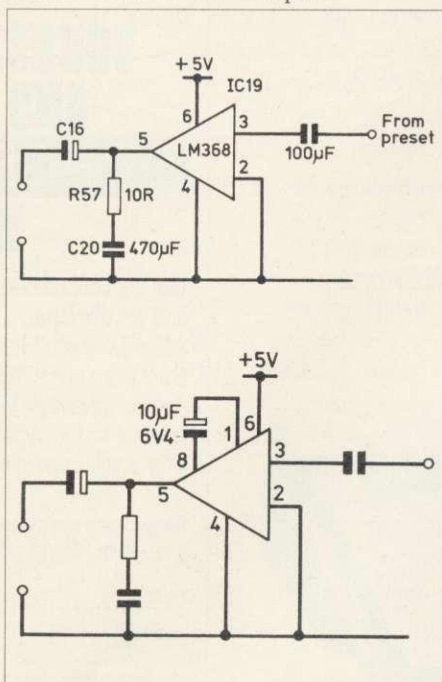
Then check the set of control codes given here for the Epson RX80 against your printer. Do look carefully at such things as whether the printer code is reset to the default at the end of a line (such as Enlarged mode set using code 14) or if the code will continue reset by another code (such as Enlarged mode set using codes 27,87,1). Sometimes the command can be reset by the same code.

One problem for people like me, as well as software writers, is that we do not have access to every make of printer. My next suggestion, therefore, is for readers to help us to help you. Having done the checks above, drop me a line to say what make and model of printer you have, and what differences you have found between your printer and the standard set of commands and characters given here. Then it will be possible to compile and print a chart of the similarities and differences between the various printers, and also to find out which are the most popular. This will make it easier for us to keep listings compatible with as many makes of printer as possible. I hope that software producers will also take note of this chart, so that every attempt can be made to ensure that software works on as many printers as possible.

## MORE SOUND FROM THE BBC

There are times when the sound or speech facilities on the BBC micro are very useful, but people moan about the pathetic quality and volume of the sound and lay the blame firmly on the speaker. In fact, the speaker is not as bad as many would have you believe. In any case, it can easily be replaced with a larger speaker. The major criticism, though, is the lack of volume. You can increase the volume without adding external amplifiers.

The amplifier circuit first mixes the signals from the sound system, the speech system and from pin 15 of the 1MHz bus. This then passes through a preamplifier (IC17 on the circuit board) and the amplified signal goes to a volume control, then to PL15, and last, on to the main amplifier (a power amplifier) which provides a strong enough signal to drive the loudspeaker. PL15 is not a plug as such, but a pair of terminations on the left-hand side of the circuit board, at the front near the power supply – just beyond the edge of the keyboard circuit board. This can be used as a sound output to a larger amplifier, and can be fed into the AUX socket of a hi-fi amplifier.



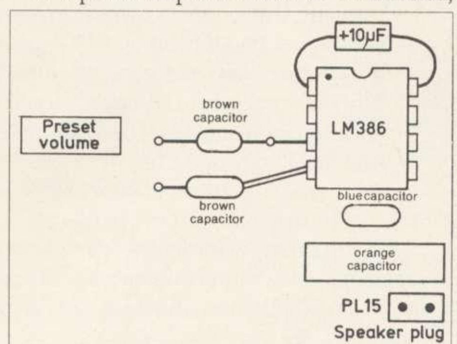

**Top: original BBC micro sound circuitry. Below: with the modification**

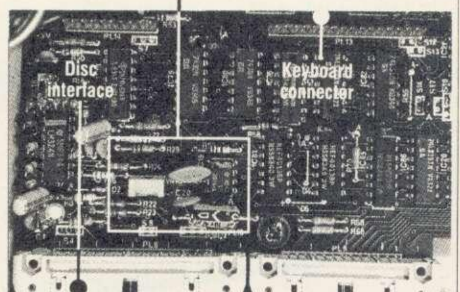
The volume control between the preamplifier and the power amplifier has been thoughtfully placed under the keyboard to make adjustment as difficult as possible. The volume can often be increased considerably simply by altering this preset control, which is usually set half-way. On some earlier computers the control is mounted the wrong way round so that a clockwise rotation decreases the volume. This has been put right on later computers, and the screwdriver slot for adjustment faces the rear of the computer. It is necessary to unscrew the keyboard to get at the control.

IC19 is a 600mW integrated circuit power amplifier with variable gain output. It is a small 8-pin integrated circuit and is also situated on the front left-hand corner of the circuit board, under the keyboard. 600mW might not seem much, but it will give quite a loud output. It is possible to alter the volume output from this circuit by changing some of the component values round the integrated circuit.

In the BBC micro the amplifier is set to give a gain of 20. This is actually the minimum component configuration for the amplifier. By adding an extra component, the gain can be increased to 200. One capacitor, which can be soldered across the pins of the IC19, will do this – it needs to be a 10 μF 6.4 volt electrolytic capacitor. The soldering is not easy but the component is simple to obtain and cheap to buy – it should be under £1. This increase in gain makes an appreciable difference to the volume (and quality) of the sound, and can be reduced to former levels again by using the preset volume control.

A separate amplifier could be constructed,




**Top: Diagram of component positions as shown in photograph (below).**

with its own volume control, which could be fitted internally or externally and run off the computer's 5 volt line with the signal derived from PL15. The computer's own speaker will handle the extra volume.

Note, though, that as the Electron doesn't use the same amplifier components, it is not possible to improve its volume similarly.

## DATES TO RELATE TO

David Crofts has requested a routine to find the exact age in years and months for some standardised tests he has been running for the children in his school. Such a program is quite easy to write, the only real problem being the leap year. A much more difficult task is to find what day of the week a particular date will fall on, but there is a formula to do this. It's then possible to get the computer to print out a calendar for any month of any year.

Listing 2, which has been suitably embellished to give menu options, shows the techniques. It will allow time differences to be calculated to the nearest day, the day of the week to be found for any particular day, and a monthly calendar to be printed. An option on the menu allows a printer to be switched on and off. There is plenty of scope within the program for adaptation and improvement. To avoid unnecessary typing, only dates this century are catered for, although this, too, could be altered.

Having taken the advice of Bernard Emblem (see below), I have written this in mode 1 so that it will function correctly on the Electron, although the Plus 1 will be needed for the printer option.

The program is reasonably simple in operation: the time difference option will allow a time to be stored so that it is only necessary to enter in one date.

This is useful in the application outlined by Mr Crofts where the test date is normally the same and only the child's date of birth will change each time. PROCcalc will calculate the day of the week for the date given in the parameters for the procedure. The value is returned in I. PROCdate is the general-purpose date input routine. It allows the date to be entered as one string delimited by commas, and it will check for a valid date.

## WHICH BASIC

It is quite simple to find out which version of Basic is in use at the start of a program – you just examine the byte holding the year of the copyright notice within the ROM. In the Basic ROM there is a copyright notice followed by the year: 1981 (Basic 1) or 1982 (Basic 2) depending on the version. The one and the two are stored at location &8015 in the ROM. Hence a test would be as follows:

```
PRINT"BASIC ";(?&8015-48)
```

48 is subtracted from the value as the number returned will be the ASCII value of the number. The ASCII value for 1 is 49.

Another, simpler, way is to press Break, and then to use the REPORT command, which should give the copyright notice.

## WHICH MACHINE

It is possible to test which type of machine a program is running on from within a Basic program.

This is done by using the negative INKEY statement INKEY (−256). An Electron will return a value of 1, a BBC will return a value of −1, and a BBC B+ will return a value of −2, unless the CTRL-Z !BOOT is used, when a value of −1 will be returned.

## QUICKFIRE QUESTIONS

Mr Samson has tried the Automatic Menu Program on his Solidisk double-density filing system. He found that it worked correctly in the single-density mode, but would not work in the double-density mode. He wonders if it is possible for me to produce a version for him which will work on double-density.

The simple answer is no and the reason for this is also quite simple. There are now enough Acorn DFS systems around (five to my knowledge) without considering all the alternative DFSs and their various versions, let alone the double-density DFS, to make developing and testing such programs very difficult indeed.

To try to develop and test a program on all the variations would be almost impossible. Think of the number of BBC machines that would be needed! ZIF sockets or sideways RAM can help, but are not a real solution. Trying to keep updated on the latest versions of each DFS is also quite a problem.

---

Bernard Emblem writes to point out that more consideration should be given to Electron owners. He also says there should be more programs that specifically include the Electron and not just pay it lip service.

I actually get very few letters from Electron owners, so if you have a problem with your Electron, speak up!

---

W K Cheung from East Molesey has been using a machine code routine located at &D00 on his disc BBC machine with little success. The problem is that page &D00 is used by the disc filing system and it will corrupt any machine code stored there.

Early versions of the BBC Microcomputer User Guide indicate that this page is suitable for the user's own routines when it is actually used by the disc filing system or the Econet filing system.

Other locations that could be used instead are PAGE &900 if the serial port, sound or speech system are not being used, &A00 if the serial port input is not being used, &B00 if the function keys are not used, and &C00 if no user-defined characters have been programmed.

---

Mr Aslett from Cheltenham has written a stock-taking program that gives a screen dump on request. Although the screen dump works the first time or two, it does not work successive times.

On examining the program, it was found that the dump routine dimensions a block of memory 256 bytes long. Every time the program goes to this routine it will dimension a new block or memory 256 bytes long rather than using the old area (which is then ignored). This is the way BBC Basic works.

It is not difficult to see that the computer will soon run out of memory. The problem was masked by an ON ERROR GOTO. . . statement which returned the program to the start when there was not enough room to dimension another block of memory.

The cure is very simple: follow the advice in the User Guide, and always dimension arrays and memory space right at the start of a program, and not in a procedure that is called up repeatedly.

---

Several readers have asked if it is possible to use *Wordwise* with a printer in the proportional spacing mode and to be able to justify the text. As far as I am aware there is no simple way this can be done: certainly there is no standard feature in *Wordwise* to allow it. The only possibility is to write a clever segment program, although I suspect that this is not at all easy. Any offers?

---

An easy way to program a wait until the space bar is pressed can be done as follows:

```
REPEAT:UNTIL GET=32
```

---

To get a capital letter input, regardless of the state of the Shift Lock or Caps Lock lights, type:

```
A$=CHR$(GET AND 95)
```

---

To get a numeric single digit input regardless of the state of the Shift Lock light, use:

```
A$=CHR$((GET AND 47) +16)
```

---

*The Hints and Tips listings can be found on yellow pages 105 and 106*

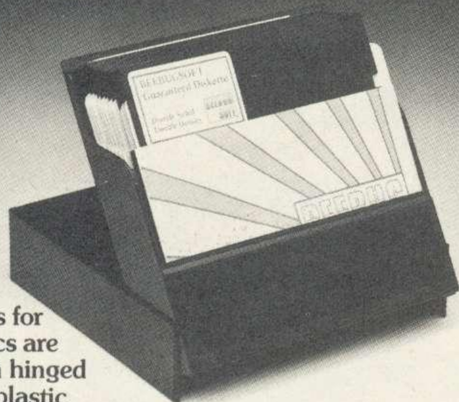
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# FIRST BYTE

## EXTRAS AND ADDITIONS TO BUY OR NOT TO BUY

**First Byte offers some timely advice on what to choose next for your BBC micro or Electron**

***Tessie Revivis***

Computing is just like any other hobby. You get the basic equipment needed to get going and captivate your interest and then once you have the bug (pun intended!), you start scouring the advertisements and shops for what to invest your hard-earned cash in next. Trouble is, unlike more traditional hobbies, there is a never-ending stream of boxes, plug-ins, plug-ons, plug-outs – well, you get the picture. Put simply, there's too much around to choose from, so just what should you get first? This question is probably the one asked most of all.

Electron owners are not as well off as Beeb owners when it comes to extra goodies but this is changing as more companies are beginning to release items for the Elk.

Obviously, the biggest factor in what you go for first is the amount of money you have to spend. Let's start at the very top of the scale and say that money is no object(!). As an Electron owner, I would put buying a Plus 1 right at the very top of my list. This gives you immediate access to a whole range of extras as it provides a joystick port, printer port and cartridge sockets.

As a Beeb and Electron-Plus 1 owner the first thing on my shopping list, without hesitation, would be disc drives.

Disc drives are at such a low price now that single drives can work out cheaper than a reasonable tape recorder, ie, under £50. Even dual drives which work in either 40- or 80-track mode (definitely the best, in my opinion) are now very competitively priced. For example, Viglen were selling such drives at the *Acorn User* Exhibition last July for only £180, and Watford Electronics were matching this at the Christmas Show.

Of course, to make use of a disc drive you will need a disc interface fitted. The BBC B+ and BBC 128 have these fitted as standard, so no extra cost is involved. On the model B you need only pay a further £50 to get the new Acorn double density disc interface. So, in the worst case for Beeb owners, you're looking at about £230 to get yourself a disc system.

There are many other different disc drives and interfaces around and these have their merits – so, before you decide which one to go for, consult reviews in back issues of *Acorn User*, the pertinent one being the July 1985 'Disc Special'.

The choice of disc drives for Electron owners is a bit more restricted and is split between the expensive Acorn Plus 3 (£229), the cheaper Cumana disc interface (£115) and the cheaper-still Solidisk system (£59). The latter two are simply interfaces which plug into the Plus 1 and connect to normal drives. I have used the former two and both are recommended, but I haven't seen the Solidisk system yet.

The next thing on my shopping list would be a ROM/RAM board and, for BBC B owners, a shadow RAM board. The virtues of these were covered in last month's First Byte so I would refer you to that. Expect to spend about £100 for the two, though, and again look through the reviews (Chris Drage has covered this topic extensively over the last year) before making your choice.

It might surprise you that I've waited until now to suggest a printer. But really, unless you have a positive need for one, ie, for business or writing purposes, you can get by without one. Printers also tend to be expensive bits of kit. The last issue of *AU* contained a round up of what's around, so consult this and the individual reviews by George Hill that have appeared over the last 18 months.

The final big cash cost would be a monitor. If you are using a TV set, they are worth considering, especially if you are spending more than five or six hours a week at the keyboard – you'll find the display much easier on the eyes. RGB monitors are, without doubt, the best and you can even get monitor/TV combinations so that it can double up as a portable television. Chris Drage's roundup in




**The Plus 1: First choice for Electron owners because of the access to extras it provides**

the November '85 issue contains an excellent guide to what's around.

All the items I've mentioned come under the heading of major expenses – the sort of things you'd usually have to plan for. However, we all like to buy things on the spur of the moment: at shows, or simply in fits of impulse! By far the most popular cheaper, serious add-on is the ROM. This simply plugs either inside the computer or on a ROM board and can provide you with the commands or even new languages. For example, the most popular ROM is the wordprocessor (for the uninitiated, this turns your computer into a very sophisticated electronic typewriter, allowing you to type letters, reports and book manuscripts with the minimum of fuss). Of course, you need a printer to get the final result – or do you? On paper, yes, but there's no reason why you can't post letters or reports to friends as a file on tape or disc. Providing they have a similar wordprocessor they can load your file in and read the document!

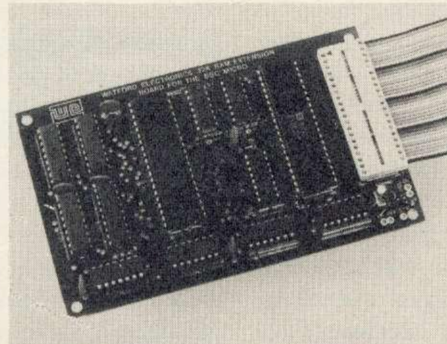
If you're getting bored with Basic, you might like to try one of the host of other languages now available for the Beeb and Electron in ROM or cartridge format. They include Forth, Pascal, Lisp, Comal, BCPL and Micro-Prolog. Some languages are more complicated than others. Comal is similar to Basic in many respects but is very much better. Pascal is very popular, but I prefer Forth. Again we have featured many of these in past *Acorn Users*, so consult your indexes first; read about the languages which interest you and then see what's available.

If you like programming in Basic, there is a wide range of utility ROMs around to assist you. The normal term for these is Toolkit or Toolbox and they generally add about 20 commands or so to your micro's vocabulary to help you in your program writing. Others are more specific. For example, Acornsoft's *Basic Editor* is a must for regular Basic programmers and Beebugsoft's *Sleuth* (BBC only – reviewed on page 189) is a very useful tool as it allows you to single-step through your Basic programs so you can locate any problems that might not be obvious.

There is also a range of what could be called 'serious' or 'business-biased' ROM software available. This includes databases – suitable for keeping records of just about anything – and spreadsheets for processing financial matters. Although business-orientated, they also make useful additions to the 'home office' for accounting, address book and club record purposes. Examples of each include *Viewsheet* and *Viewstore* from Acornsoft, *Intersheet* from Computer Concepts and *Ultracalc* from the BBC.

Most of the ROM-based software mentioned above can be found in disc or tape format which is certainly cheaper but often not as useful as it eats into the micro's memory.

The mouse has become a very popular peripheral for the BBC micro over the past year, the AMX version in particular. This strange device is hand-held and can be used to move a pointer across the screen by physically moving the mouse across the desk surface. Three fingertip switches are usually incorporated in the mouse and items and actions can be selected from a menu presented by the mouse software on the screen. The mouse has a variety of uses and the AMX version comes with a very good art package.



**ROM/RAM boards: Third on the shopping list**

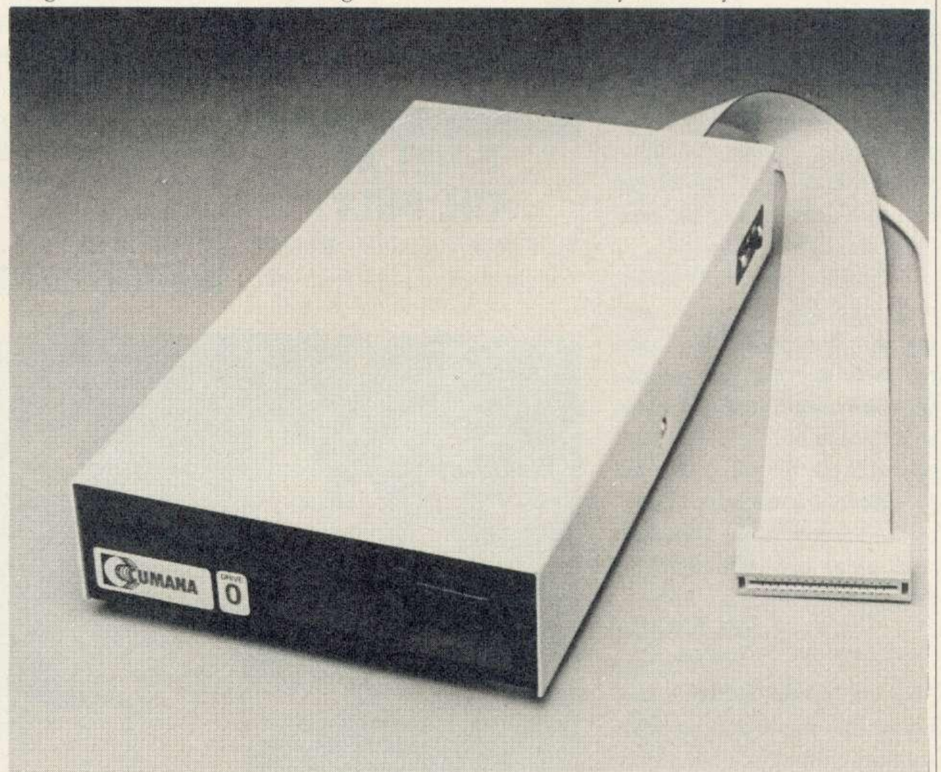
The tracker ball operates in a similar fashion to the mouse except that it remains stationary within its base and the ball itself is rotated around. Depending on your choice, you can expect to spend between £60-£90.

One thing the computer boom did was to give the book industry a short-lived peak. I imagine that more books dealing with the home micro hobby have been produced over the last five years than all other hobbies put together. A sad fact is that much of what has been published has been appalling.

However, there are still some excellent books around but you have to look carefully. You can usually tell a lot about a book by flicking through it. A well-produced book is often a good one. Avoid tatty looking books printed on what often looks like toilet paper. They may be cheaper but they are, nine times out of ten, not worth even the few bob being asked. Of the computer magazines *Acorn User* probably has the most authors with books to their credit. The list is impressive: Joe Telford, Martin Phillips, Simon Williams, Simon Dally, Ian Birnbaum, Jim McGregor, Alan Watt, Ferguson and Shaw, Dick Harrison, Jacquetta Megarry, John Coll, Alex van Someren, Paul Beverley and Bruce Smith.

If you read *AU* regularly, you'll be familiar with the style and approach of the authors and know what to expect. Of course, there are other books worth considering – for example, books published by the BBC are, in my opinion, always worth investing in.

To summarise: before parting with your cash for new bits of kit, stick to the golden rules: decide on what you want to get; look at adverts and shops to see what's available and how much it costs; read at least one review of the item(s) you are considering; and, last, try it in the shop for yourself. If the item passes all these tests, the chances are that you will be happy and satisfied with your purchase and get real value for your money.




**Disc drives: Definitely a must; preferably 40/80 switchable**

# LETTERS

Write to Letters, Acorn User, 68 Long Acre, London WC2E 9JH

## UNSUITABLE LOAD MODE

Sir, Two years ago I bought an Acorn Electron, with which I'm very pleased. I read a lot of books and talked to many people, and I soon found that many had experienced trouble in LOADing or SAVEing programs, and some had been been driven to despair.

For many, the problem could be using modes 0 to 3 while saving. The *User Guide* and Plus 1 handbook mention this, but only in the *Advanced User Guide* is the full explanation given (page 200). If the screen mode is set to 0 to 3, some information bits can get lost by falling off the end of the 6502 register! A more detailed account is given on page 210.

The minimum Acorn should do is publish a sticker to go in all their user guides saying 'Danger – any attempt to load in modes 0 to 3 may damage your health!'

**D H Mash**
Essex

## DAD'S BENT

Sir, Help! I am a computer enthusiast of tender age, but by the looks of things I will be 101 years old before I get a modem.

For some reason (don't ask me why), my dad has got a bent against communications and refuses to let me have a modem. When we bought a new television he refused to have teletext! I have offered to pay for the modem and my share of the telephone bill.

Will someone on the *Acorn User* team please explain to him the delights of communications?

**Jonathan Parker**
Birmingham

**Ah, come on Dad, don't be mean! Remember that Micronet costs are put separately on the phone bill, and local calls (which you will be eligible for) are only about 40p an hour.**

## HANDY PERIPHERAL

Sir, You must do a feature on what must be the ultimate add-on for the BBC micro. It surpasses the mouse, B+, B++, second processor and anything else you care to name. No other company can touch it!

What is this amazing accessory? I hear you ask. Well just look at the Torch Computers ad on page 155 of the November issue of your excellent publication. The guy in the middle has three hands!

This must be a first for any micro and a real market crusher for Torch. Please ask them when the third hand will be released so that I can have one of them first.

Joking apart, the Torch system is excellent. I have used one for about six months and it is a worthy upgrade to any BBC micro.

**Kevin Crosbie**
Devon

**Thanks too to John Buyers of Dorset for pointing this out.**

## E-NET AT THE POLY

Sir, I am prompted by the article 'Caught in the network' from your October issue to write to you as I am concerned by both it and the front cover banner which proclaimed it as 'Practical guide to networks in schools'.

What began as an apparent look-at-what's-around with nearly two columns devoted to Acorn's Econet turned into a hype for Schoolfax after a three-line mention of Amcom's E-Net. Messrs Drage and Evans then proceeded to sideways RAM before passing on to Meadnet. What happened to the practical guide to E-Net? The balance must be redressed.

Two years ago I commissioned the largest E-Net to date in this country. It is 2.1 km long and currently supports 106 nodes based on a 60Mb Winchester. It is used within the faculty of educational studies at Oxford Polytechnic by staff and students for a variety of administrational and teaching uses. The article carried no details of the range of hardware and software for E-Net, its compatibility, reliability, or ease of use with Amcom's icon driver package and AMX Mouse.

E-Net has never let me down. It supports electronic mail, icon, lightpen, touch screen, Concept keyboard, expanded keyboard, Quinkey, Bitstik and joystick controlled software. Your article highlighted the problem that Econet users have in obtaining compatible software. E-Net has, due I think to the length of time the system has been around, much more software available to it.

The article mentioned the ROM to RAM 'dilemma', but *Wordpower* wordprocessor and mail merger package allows us, for a very modest fee, to use it across the network. Also there is a very powerful and fast database, MPSS. If users need anything more powerful, machines fitted with Amcom's superclient ROMs can be connected to Megastream for access to any of our large Prime mainframes.

There are over 400 E–Nets installed nationwide and there is a newly formed user group. To this end I run a 24-hour Videotex service on (08677) 4980 using Communitel.

Amcom's team are always at hand to give advice or to discuss new ideas. Software upgrades etc, at nominal cost, regular information packs and friendly phone calls reinforce my belief that E-Net is quite simply the best network available for the BBC computer and Education.

I allow software houses to develop E-Net software on the 'net', as Oxford Computer Systems the latest firm to use us, will attest. They are developing Oxford Pascal for E-Net.

Readers wishing to know more may contact me on (08677) 2691, extension 247.

**Howard Laurence Ward**
Lecturer in Computer Education
Oxford Polytechnic

**Nick Evans and Chris Drage reply: It was not the purpose of our article to review, document, compare, or catalogue every system. Our objective was to provide information about how systems may be used in the real, school situation. Thus most of our comments about Econet will apply to other networking systems including E-Net.**

**Two columns were devoted to Econet simply because most network users we sampled were**



Torch's ultimate add-on – available from good second-hand shops

# LETTERS

**using this system. Our article described imaginative and innovative uses of networks in an attempt to motivate others.**

**We were supplied with a list of Symbnet users, but none of those questioned was using the net in an innovative fashion. From our list of E-Net users, it appeared that all bar New College (Swindon) were using the network simply for mass distribution of software. If we appear to overemphasise the work being done at New College it is for two reasons. First, they are doing something thoroughly innovative, and second, they continually update us about new developments.**

**Many network users have expressed interest in sideways RAM. Far from being a 'hype', the comments on sideways RAM from Bosworth Community College must be of great interest to these readers. Similarly, Meadnet was mentioned because of the number of schools we discovered which have RML 380Z computers but have opted since for BBC micros. Meadnet offers a very practical application for schools in this situation.**

**It is easy for Mr Ward with his 'Rolls-Royce' E-Net network to lose touch with reality in education. The simple fact is that most of us simply don't have the resources for a 2.1 km long, 106 node, 61Mb E-Net. One day maybe! However, point taken.**

## SPREADING THE NET

Sir, I read with interest the letter from Mr Kirby, a software writer frustrated with Econet, in the November issue of *Acorn User*.

As a teacher in charge of my school's level 2 Econet system I would be happy to assist in the evaluation of any software he might wish to try out.

Perhaps it would be possible for you to pass our address to Mr Kirby in order that we might be able to assist each other?

To date I have been dismayed at the large amount of software that looks interesting, but is not suitable for net operation.

My colleagues and I would be only too pleased to establish links with software writers. Any arrangement could be mutually beneficial.

**J L Fisher**
Matthew Arnold School
Middlesex

## CATCH THE BRAIN TRAIN

Sir, Mr Marsh, in his letter in the October issue of *Acorn User*, highlights the problems facing Electron owners trying to find good quality educational software. My company, First Byte Computers, specialises in educational software for home users of the BBC micro and Electron.

For an annual subscription of £3 owners can join the Brain Train Club and will receive a full catalogue, a regular newsletter to keep them up to date on the educational software available, and a discount on every program ordered.

The catalogue currently contains around 130 programs suitable for the Electron. I shall be happy to supply a catalogue and further details on receipt of a large stamped addressed envelope to Northington House, 59 Gray's Inn Road, London WC1X 8TL.

**B P Viner**
London

## GAME ACE

Sir, While playing *Moonraider* by Micro Power I have just scored 3,875,950. It took me six hours (from 11pm to 5am) and it beats the hi-score which you currently have listed in your hi-scores table. Also I have scored 3,955,950 on Acornsoft's *Planetoids*. Please consider these for inclusion in your next hi-score table.

Keep up the great magazine!

**Lindsey Tasker**
North Yorks

## THE GENERATION GAME

Sir, How would you like a game that's more addictive than *Elite*? And ten times faster than *Zalaga*? Or a wordprocessor with more facilities than *Wordwise Plus*? How about a C compiler for the Beeb? I'm going to produce all of them.

Let me explain . . . Project Beeb will yield the best programs ever written for the BBC Micro. In fact it will yield all programs ever to be written for the Beeb.

The heart of the project is a program generator (Listing 1). It simply puts all possible combinations of numbers in the Beeb's memory locations and saves memory after each update.

There are only a few minor problems associated with Project Beeb: I need computers, discs, drives and time. But, in fact, these can be easily overcome. First the computers: if everyone buys a BBC micro, this will be the saving of Acorn. There is only one disadvantage: Uncle Chris and Uncle Hermann will probably get heart attacks as they sold nearly all of their Acorn shares.

And if Cumana, 3M and TDK want to be sure of their futures, simply send me some (?!) discs and drives. And the problem of time? This is no problem at all. It is the solution to the greatest problem of our time. If all the unemployed were to work on Project Beeb, all unemployment will be solved at once!

The program generator works on memory locations &1100 to &8000; this is 27.75K or 28416 bytes or 227328 bits. Every bit can contain a 0 or a 1, so the program generator will produce $2^{227328}$ different programs.

The main task of the co-operators will be to test every program produced by the program generator, by *LOADing it, trying to make it work by means of CALL &1100, CALL &1101 etc and reload the programs if necessary. This is 28416 CALLs per program, so in total there are $2^{227328} \times 28416$ CALLs to be made. (Does anyone know how much this is? My Beeb says 'exponent range' when I ask him.)

Suppose that one man can test one program every week (which seems rather much). Then project Beeb will give us $2^{227328}/52$ man years of work! Mrs Thatcher – *Acorn User* has my address.

I would advise anyone else to wait and look at the software charts every month. See you there!

**Mark de Weger**
Stadskanaal
Netherlands

```
   10 REM Program generator
   20 REM by Mark de Weger
   30 REM BBC B/Electron
   40 REM (c) Acorn User
   50 REM January 1986
   60 :
   70 pointer=&70
   80 !pointer=&1100
   90 REM Tape: &E00
  100 :
  110 FOR pass=0 TO 2 STEP 2
  120 P%=&B00
  130 [OPT pass
  140 .make_zero
  150 LDA #0
  160 TAY
  170 TAX
  180 STA (pointer,X)
  190 INC pointer
  200 BNE make_zero
  210 INC pointer+1
  220 LDA pointer+i
  230 CMP #&80
  240 BNE make_zero
  250 :
  260 .new
  270 LDY #&FF
  280 .loop
  290 STY &7FFF
  300 JSR save_memory
  310 LDY &7FFF
  320 DEY
  330 BNE loop
  340 :
  350 LDA #&FE
  360 STA pointer
  370 LDA #&7F
  380 STA pointer+1
  390 :
  400 .inc_byte
  410 CLC
  420 LDA (pointer),Y
  430 ADC #1
  440 STA (pointer),Y
  450 CMP #&FF
  460 BNE new
  470 :
  480 LDA pointer
  490 BNE no_dec
  500 DEC pointer+1
  510 .no_dec
  520 DEC pointer
  530 CMP #&11 \for tape &E
  540 BNE inc_byte
  550 RTS
  560 :
  570 .save_memory
  580 LDX #string MOD 256
  590 LDY #string DIV 256
  600 JSR &FFF7
  610 JSR &FFE0
  620 RTS
  630 :
  640 .string
  650 ]
  660 $P%="SAVE MEMORY 1100
8000"
  670 P%=P%+LEN$P%
  680 ?P%=13:P%=P%+1
  690 NEXT pass
  700 CALL make_zero
```

**Listing 1. Programs by the million**



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| **INTEL 8271 CONTROLLER** | **£43.95a** |
| **ACORN DNFS KIT** | **£68.95b** |

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**ACORN 1770 DFS UPGRADE KIT**
Kit comes complete with daughter board, chip set and software. Enables ADFS to be fitted. Includes many new commands e.g. *FORM *ROMS *FREE *MAP etc. **£48.95b**

**ACORN ADFS UPGRADE**
A rom upgrade allowing unlimited file names and hierarchical directory structure. Treats each drive as one side increasing capacity to 1.28 Mbytes on dual 80tr d/s drives. **£28.95a**

**VIEW** – Version 2.1 of Acorns wordprocessor. Allows 80 column editing, printing direct from memory etc. **£47.95 (b)**

**VIEW PRINTER DRIVER GENERATOR** – Allows you to tailor a printer driver to your own printer. Comes with drivers for FX80, Juki 6100, Olivetti JP101 and others.
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Cassette – **£9.50 (a)**

**VIEW 3.0** – A version of View suitable for the BBC+. Comes with a cassette version of the Printer Driver Generator. **£79.95 (c)**

**HI-VIEW** – A disc based version of this popular word processor for the 6502 second processor giving 47k of user memory. **£44.95 (b)**

**VIEWSHEET** – Acorns spreadsheet rom giving 255 rows by 255 columns, multiple windows, works in any mode, wide use of function keys, fully compatible with View. **£47.95 (b)**

**VIEWSTORE** – Acorns new database rom. Works in any screen mode, many powerful sorting facilities, can be spreadsheet or user defined card layout. Max record size is 60k. Output can be sent to View and Viewsheet. Comes with comprehensive manual, utilities disc etc. **£54.95 (b)**

**GRAPHICS ROM** – Acorns new 16k graphics rom giving many new commands for extensive graphics. Circles, ellipses, arcs, rectangles, parallelograms, segments and sectors etc are all available. Comes with manual and utility cassette. State B or B+ version. **£27.50 (b)**

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**INTERSHEET** – The first of the ROM-LINK integrated rom packages from Computer Concepts. Menu driven, 40/80/105 column display, very fast, can be used with View or Wordwise, up to 16 spreadsheet in memory at one time. Supplied on two roms with reference manual, function key strip and quick reference card. **£47.95 (b)**
**INTERCHART** – The second ROM-LINK package and designed for Intersheet giving Bar, Pie and Line graphs. **£31.95 (b)**
**ACCELERATOR** – The most comprehensive compiler yet for the BBC micro. Compiles nearly all Basic, including floating point arithmetic. Compiles to intermediate G-code or to machine code. Comes on two roms with manual, disc and quick reference card. **£57.95 (b)**
**WORDWISE** – The standard BBC word processor still very popular allowing all normal features for low cost. **£35.45 (b)**
**WORDWISE-PLUS** – The new 16k version of Wordwise giving added commands for better use. Using its own language mail merging, indexing, continuous processing and multi column text can be utilised. **£44.95 (c)**
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**BROM** – A basic utility rom which includes one of the best basic editors available giving true screen scrolling. Extended error handling which uses the editor, rom management, many useful features. A very good toolkit rom. **£29.95 (b)**
**BETABASE** – A very useful database program allowing up to 65000 record to be held. Many features include versatile printing, powerful sorting routines, outputs can be compatible with Wordwise or View. **£21.95 (b)**
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**BETA-ACCOUNTS** The first of this integrated suite of programs allows Invoices and Delivery notes to be issue. 80 Column editing, sales ledger sheet automatically generated, multiple VAT rates. Can be used with Betabase. **£21.95 (b)**
**PROFILE** – A procedure library allowing up to 100 procedures on a disc, easy merging of procedures with basic programs. **£11.00 (a)**
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**WORDEASE** – A utility disc for Wordwise-plus giving many new features to this best-selling wordprocessor. Includes label printing, disc menus, versatile copying routines etc. **£19.95 (b)**
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B/E = BBC/Electron
See us on Prestel – page 60043754.

# LETTERS

## ASIAN EXPLORATION

Sir, I am currently exploring the possibility of wordprocessing using Asian character sets, for example, Punjabi.

If anyone has any experience in this area, using either daisywheel or dot matrix printers with a customised type font I would be very pleased to hear from them.

Alternatively if anyone else is interested in developing these facilities, please contact me at CODA, 45a Mansfield Road, Nottingham NG1 3FH.

**Cathy White**
CODA
Nottingham

## WATCH YOUR LANGUAGE

Sir, As a regular reader of your magazine I enjoy being kept informed about developments in the Acorn BBC micro world. I am a journalist and use the BBC micro with *Wordwise Plus*, which is very handy for my work.

I only regret that many computer magazines and handbooks expect too high a level of knowledge on the part of the user, and that's not even taking into account the complications for non-English speaking users.

I understand that the really interested programmer gets more out of the intricate programming difficulties than the average user. I consider the computer a useful tool just like my telephone, typewriter, record player, TV set or cassette deck. I do not have to know the workings of such equipment to enjoy using them.

Too many computer writers use incomprehensible technical language, without explaining what they mean, and automatically assume that the reader knows what they are talking about.

Computer manufacturers also surround their products with an aura of mystery and technological terminology. They get all excited when they announce extra memory in their computer, but when I look at the details it is only available for certain programs and in certain modes.

I would like to thank *Acorn User* and other magazines dealing with the BBC micro for telling us how to get the best out of our computers, but I don't want to spend hours typing in a program only to find out that it does not work because there are printing errors, or order the disc or cassette of a program to find that when I LIST lines have been altered and sometimes added to the original.

I don't like to buy expensive commercial programs only to discover after I !BOOT the program that it does not work because it is not compatible with my BBC+, while it worked perfectly on my old BBC B.

So please unravel the mysteries of all the masses of programs and hardware, and so give us an even better service.

Then the computer will be what it is intended to be - a tool to be used by everyone and not a plaything for academics and technocrats. Let us have handbooks written in a clear and concise manner by people who know how to communicate their thoughts comprehensively to others.

A good example is the booklet *An introduction to Wordwise Plus*. It is clear, concise and uses everyday language with the ordinary reader and user in mind.

I would like to see more of that and I think many other users of computers would too. Take the arty-crafty attitude out of the computer language and the benefits of computers will be enjoyed more thoroughly and widely than is the case now.

For those who want to become amateur experts there is plenty of scope, but let us not assume that everyone wants to become one. The only thing I, and probably many others, want is to use the computer for our benefit and enjoyment without having to delve into the complicated workings of computer languages, different operating systems and other often mysterious terms to explain simple things.

**Henry J M Brinkman**
The Hague
Netherlands

## ACCESSING THE OU'S DEC

Sir, Any *Acorn User* readers who are also Open University students might like to know that I am using the Nightingale modem with Pace's *Commstar* ROM to access the OU's DEC computer. *Commstar* defaults to the correct protocol for this system and connecting up could not be simpler.



**Nightingale talks to DEC**

The requirement to use an 80 column screen mode is not essential, either, as long as you are prepared to put up with words wrapping round to the next line.

*Commstar*'s buffer is useful if you want to save a technical version to tape or disc – essential if you do not have a printer.

**R D Cornford-Wood**
Surrey

## BESA JOLLY GOOD FELLOW

Sir, From time to time you publish letters, especially from Electron owners, who are having difficulty finding a selection of educational software.

Cornwall Software has a particular interest in the educational field and offers a local and mail order service. We can be contacted at The Coach House, Carn Eve, Sennen, Penzance, Cornwall TR19 7BD. Tel: (0736 87) 500/569. After over two years experiencing a similar difficulty from the other side of the fence, we are happy to be involved in the BESA scheme which gives us access to a wide range of products.

I hope we shall now be able to ease the frustrations of the many micro users seeking suitable educational software and I shall be glad to offer them informed advice, as a teacher myself, as well as supplying any items they seek.

**D S Hillage**
Cornwall

**BESA can be contacted through Martin Neild at McMillan Software on tel: 01-836 6633 or Barbara Warren at Calpac on tel: (04867) 2584.**

## OVERPRICING ERROR

Sir, In your otherwise favourable review of our CTL Model 423 Eprom programmer in the November issue, the reviewer complains a bit about the price.

This is not really surprising since you state the price to be £132.25. In fact the all-up price including VAT is £109.25.

**Erich Wagner**
CTL, London

## NOT AMUSED

Sir, Some confusion has arisen over advertisments indicating that the game MUD was available from MUSE.

I should like to point out that MUSE is a national organisation which exists to help all those involved in education to make effective use of small computer systems in the promotion of learning. The organisation has been in existence for over 10 years and is well known in the field of educational computing.

MUD is not a program which is available from our software catalogue. It appears that the name MUSE has recently been adopted by Multi-User Entertainments Ltd, who promote the game MUD.

**Diana Thomson**
MUSE, Hull

# CENTRAL PROCESSING

**For a fast answer to your question, write to Central Processing, Acorn User, 68 Long Acre, London WC2E 9JH**

**J. Cowley, Derby**
Thank you for your kind comments regarding Richard Harris's article on the 8271 disc controller chip (October 1984). You should be able to pick up a data sheet on the 1770 from a reputable electronic shop, and from this you will find all the details regarding direct programming of the chip. There are no immediate plans to carry a similar article on the 1770 as supplied on the BBC B+ or the 1770 upgrade for the BBC B (or Electron Plus 3). However, it is certainly a good idea and I am sure one of our 1770 users will come up with a suitable article in the not too distant future.

**H. Taylor, Luton**
A graphics screen can be dumped to a printer with the aid of a screen dumping program. The type of dump program you require will depend on the format of your printer. If your printer is Epson compatible then most commercially available programs will work – for example, *UserDUMP*. As you have an Electron, to use such a ROM you will need to have a ROM extension socket of which a variety is available (see First Byte – December 1985).

Of course you can use a program held within main memory to dump the screen to a printer. George Hill's program in the December 1984 issue of *AU* would be suitable. Mixing text and graphics is certainly possible. Once you have displayed the graphics on the screen you can simply use the PRINT TAB commands to position it at the appropriate point. If you wish to fine tune your printing, you could 'join' the print and graphics cursor together with a VDU 5 command and then use the graphics co-ordinate system to position your text.

Full details on PRINT TAB


**Robots galore in June**

and VDU 5 can be found in your Electron *User Guide*, but an example is given here:

```
10 REM PRINT TAB DEMO
20 MODE 5
30 PRINT TAB(5,5) "Print at
TAB 5.5"
40 VDU 5
50 MOVE 100,100
60 PRINT "Printing at 100,100"
```

**James Preston, Redditch**
The June 1985 issue of *Acorn User* contained details on buggies, as did the November 1984 issue.

**A.L. Hoekstra, Holland**
The 12k of sideways RAM supplied with the BBC B+ can be used from within programs. The January 1986 issue of *Acorn User* contains an article by Ian Copetake that demonstrates the techniques involved.

**Christopher Reeves, Leicester**
I do not know of any programs that will greatly speed up the operation of the cassette filing system on the BBC micro. Even if one does exist you would not be able to load your commercial tapes any faster, only ones that you had saved using the turbo program.

**Richard Grant, Newcastle**
Jonathan Griffiths covered the EQU command within the Basic 2 assembler and how to emulate this from Basic 1 in the January 1984 issue of *Acorn User*.

# DEAR KITTY

**For simple answers, address your queries to Kitty**

Could you please explain a term that I see popping up regularly in your magazine (and in others – though I never buy those of course!). The term is Hex.

**Ron Nathan, Essex**

*Hex is shorthand for the long-winded term hexadecimal. Put simply it means numbers to the base of 16. This is really not as complicated as it may first seem.*

*Normally we work in a decimal number base, ie 10, using the numbers 0 to 9 inclusive. In a hex base we retain these and then use the letters A,B,C, D,E and F to represent the numbers 10 to 15. Thus 13 in decimal is D in hex. To show that numbers are in hex we precede them with '&', ie &D, &C and &9.*

*Using a hexadecimal base makes handling numbers within computers very simple. Computers consist of millions of electronic circuits that can have only one of two states – just like a light bulb they can be on or off. If a circuit is on then it is said to have a value of 1. If it is off it has a value of 0. The binary number base works in this way.*

*Converting from binary to hex is much easier than is converting from binary to decimal.*

*Consider the binary number 1011. To transform this into decimal we simply add the values of the binary digits (bits) that are set. The value of each bit is twice that of the previous one. So the values of the first four bit positions, working from right to left are: 8 4 2 1*

*The binary number 1011 has bits 8, 2 and 1 set so its value is 8+2+1=11 decimal or &B.*

*Computer memory is arranged in pages. Each page of memory is 256 bytes in length – starting at byte 0 and increasing to byte number 255. We refer to each individual page by a number.*

*The most commonly used page numbers are those where we begin to store Basic programs. On an Electron or BBC tape system PAGE is set to &E00 (in fact more correctly the page number is &E). On a disc system, though, PAGE is set to &1900 (ie, the page number is &19).*

*It is very easy to represent the number 255 in binary and therefore hex. In binary 255 is 11111111 (ie 128 + 64 + 32 + 16 + 8 + 4 + 2 + 1), and this can be represented in just two hex digits, &FF.*

*To perform the conversion (in either direction) all you have to do is break the binary number down into blocks of 4 bits thus:*

*1111=F*
*1111=F*
*therefore 11111111=&FF.*

*Of course the term k is used to express large amounts of memory. There are four pages of memory to each k, therefore 1k of memory consists of 4×256 bytes = 1024 bytes. The total number of bytes in a computer (RAM and ROM) can be found by multiplying the number of 'k' available by 1024. Therefore the standard Beeb and Electron both have 64(k) × 1024 or 65,536 bytes.*

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| BBC B Plus (64k) | £375 |
| BBC B PLUS with 128K | £415 |
| BBC B PLUS with Econet | £389 |
| Extra 64k Upgrade Kit | £32 |
| 1770 Upgrade Kit | £42 |

**ECONET ACCESSORIES**

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| 10 Station Lead | £24 |
| Advance Econet User Guide | £8.50 |

| | |
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| 6502 Acorn 2nd Processor package | £175 |
| Z80 Acorn 2nd Processor package | £339 |

| | |
|---|---|
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| TORCH Z80 Card+Soft. + Disc Pack | £499 |

| | |
|---|---|
| Acorn Bitstick | £325 |
| Acorn IEEE Interface Complete | £280 |
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(Securicor carriage on Micros £7)

## Dust Cover for BBC Micro

£3.50

## VARIOUS PRINTERS

- EPSON RX100 £342
- EPSON FX80 Printer £265
- EPSON FX100 Printer £429
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- EPSON Hi-80 Printer Plotter £345
- EPSON Paper Roll Holder £17
- FX80 tractor attachment £37
- SEIKOSHA GP50A & GP50S £69
- Centronics Printer Cable to interface all the above Printers to BBC £6

(Securicor carriage charge on printers £7)

## EPSON LX-80 PRINTER

EPSON's new Low cost High performance printer. Print speed 100 cps, NLQ mode 22 cps. 9 needle print head. Full FX-80 capability is supported with downloadable fonts. Friction feed is supplied as standard, with tractor feed and an attractive auto sheet feeder as optional extra. NLQ Mode and current typeface selectable from front panel.

Price: **£220** (carr £6)
Tractor Feed Attachment **£20**
Single Sheet Feeder **£49**
Spare Ribbons **£4**

## RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

| | | | |
|---|---|---|---|
| RS232 | £25 | RS232 + 2K Buffer | £55 |
| IEEE 488 | £62 | | |

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## CENTRONICS GLP (NLQ) Printer

**A major price break-through in NLQ Printers from Watford**

At last, a full feature Epson compatible NLQ printer at a price that everyone can afford. Due to Watford's bulk purchasing power and low margins we can now offer this incredible printer deal direct from the manufacturers to our customers.

The Centronics GLP features a near letter quality (NLQ) mode using a 23 by 18 dot matrix for each NLQ character (this is the same as is used by the very popular Kaga Taxan printers).

Single, double and quadruple density graphics modes as well as four character widths and super/sub script printing are also supported, along with many other facilities normally found on printers costing twice as much.

Although the GLP is a very compact printer, it can handle paper up to 10 inches wide. Friction feed is supplied as standard with a low cost tractor feed available as an optional extra.

The GLP is a bidirectional logic seeking printer with a 9 needle print head and features a long life ribbon cartridge. The GLP is supplied with a Centronics parallel interface and comes complete with a ready fitted alternate NLQ font ROM containing a different and more pleasing type face (other font ROMs available, including Gothic, Courier, Italic, Copper Plate, Script, Double, Bold etc.)

Send an SAE for further details of the GLP NLQ Designer and extra font ROMs.

Christmas Offer **£99** (carr £5)
Tractor Feed Attachment **£9**
Spare Ribbon Cartridge **£4**
NLQ DESIGNER ROM for Centronics Printer **£20**

## BROTHER HR-15

Brother HR15 is a high-quality daisy-wheel ideal for a budget printer for serious use. Notable features of this printer include a 3k buffer, 18cps (max), bi-directional proportional spacing, Centronics interface standard, (RS232 optional), optional Sheet Feeder and Keyboard.

ONLY **£315** (carr. £7)

| | |
|---|---|
| Single Sheet Feeder | £185 |
| Electronic KEYBOARD | £135 |
| TRACTOR FEED Attachment | £84 |

RIBBON CARTRIDGES:
Fabric **£3.75**; Carbon **£3.75**; Multistrike **£6**

DAISYWHEELS (various typefaces) **£18**

**We are now offering at no extra cost ON-SITE 12 months maintenance on all HR15 Printers purchased from us.**
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Carriage on 1,000 Sheets £1.50

## KAGA KP810 NLQ PRINTER

This excellent printer is fully Epson FX-80 compatible and offers superb NLQ printing. Over the last year, we have sold more of these printers than any other make. Write in for further details of this printer.

Special Offer: ONLY **£229** (£7 carr.)

| | |
|---|---|
| Kaga RS232 Interface | £49 |
| Kaga RS232 Interface + 2K Buffer | £69 |
| Kaga RS232 Interface + 16K Buffer | £95 |

## KAGA KP910 Printer

Similar to the KP810 but with 17" carriage for wide print. Gives 156 columns of normal print or 256 columns in condensed mode. Ideal for printing out spreadsheets.

ONLY **£339** (£7 carr.)

## PRINTER LEAD

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

| | |
|---|---|
| Standard length (4 feet long) | £6 |
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We can supply leads to any required length.

**RS232 Cables** available in any length and any combination. Please telephone for your requirement.

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| FX80/MX80 | £4.50 | £4.95 |
| RX80 | £4.50 | £4.50 |
| GP80 | £4.50 | – |
| GP100 | £4.95 | £3.95 |
| GP250 | £5.95 | £3.95 |
| KAGA KP810 | £5.95 | £4.75 |
| CANON PW1080 | £5.95 | £4.75 |
| MICROVITEC MONITORS | – | £5.50 |

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

## SEIKOSHA SP-1000

This new attractively finished dot matrix printer features **Near Letter Quality** mode and is unsurpassed at the price. Provides high quality printout for word-processing, whilst retaining a fast mode (100 CPS) for draft copies. Other features include a variety of character sets, underlining, bold print and double strike, bi-directional logic seek, automatic paper loading, variable paper width etc. Has Friction and Tractor feed. SP1000 makes available the facilities of much more sophisticated printers at a very reasonable price.

Introductory price: **£185** (carr £6)

## PRINTER LABELS

**(On continuous fanfold backing sheet)**

| | | |
|---|---|---|
| 1,000 | 90×36mm (Single Row) | £5.00 |
| 1,000 | 90×36mm (Twin Row) | £4.90 |
| 1,000 | 90×49mm (Twin Row) | £7.50 |
| 1,000 | 102×36mm (Twin Row) | £6.25 |

Carriage on 1,000 Labels £1.00




We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

**MICROVITEC 14"**

- 1431 – Medium resolution as used on the BBC television computer programme ...... **£179**
- 1451 – High resolution, suitable for word processing in mode 0 ........................ **£229**
- 1441 – High res, exceeds the capabilities of the BBC micro ........................ **£385**
- 1431AP RGB + PAL and AUDIO ........... **£199**
- 1451AP RGB + PAL and AUDIO ........... **£269**
- Dust Cover for Microvitecs .................. **£5.50**

**KAGA/TAXAN 12"**

- KAGA KX1201G Hi-res Green Monitor ..... **£90**
- KAGA KX1202G Ultra-Hi-Res Green Monitor ........................ **£105**
- KAGA KX1203A Ultra-Hi-Res Amber Monitor ........................ **£105**
- KAGA Vision 2, Hi-Res, RGB Colour Monitor ........................ **£225**
- KAGA Vision 3, Ultra Hi-Res, RGB Monitor ........................ **£310**

**PHILIPS 12"**

- BM7502 Hi-Res Green ........................ **£74**
- BM7522 Hi-Res Amber ........................ **£77**

**FIDELITY COLOUR MONITOR**

- Medium Resolution, attractively finished, 14" RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen.

Introductory Offer: **£169**

**ZENITH**

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. The high resolution makes it good for games too – you can really see the detail that has been put into the graphics.

Zenith Green Hi-res ........................ **£70**
Zenith Amber Hi-res ........................ **£72**

**LEADS**

**BNC Lead for Zenith or Philips** ........................ **£3**
RGB lead for KAGA ........................ **£3**

**N.B.** Carriage on Monitors **£7** (securicor)

## CREDIT CARD Orders (ACCESS or VISA)

**Simply phone (0923) 33383/50234**

**24 Hour Service**




This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette.

Only **£23**

(For software on disc please add £2)

## 4 COLOUR PLOTTER PRINTER

SAKATA SCP-800 printer/plotter facilitates plotting & printing in 4 colours on paper upto A4 size, using easily replaced pens. In text mode it prints upto 12 CPS. Max 160 Char. per line. In graphics mode it offers full plotting facilities incl. drawing, moving, scaling of text, rotation & drawing of axes. (Write for a sample printout).

**Only £155**

Set of 4 SPARE PENS only **£4.50**

## SPECIAL OFFER

HITACHI EPROMs for Sideways ROMs

**2764-250nS £2**
**27128-250nS £3**

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

**6264LP (8K) £4**
**2 x 6264LP (16K) £7.50**

**PRINTER SHARERS**

Connects
3 BBC Micros to 1 Printer **£65**
6 BBC Micros to 1 Printer **£129**

## BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

**EXAMPLE PACKAGE**
BBC Model B Plus 64k, Watford Electronics' DFS upgrade, WORDWISE ROM, Twin 800k Mitsubishi drives in beige, Zenith 12" Hi-resolution monitor (Green or Amber), Brother HR15 daisywheel printer. Gemini software: BEEBCALC spreadsheet, analysis and DATABASE software on disc. 10 × 3M disc, 500 sheets fan-fold paper, 4 way mains trailing socket, manuals, all leads and BBC carrying case.

**NEW LOW PRICE**

**Only £999**

## THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

This book is superb value at only **£5.95** (Book – No VAT)

# Nightingale Modem

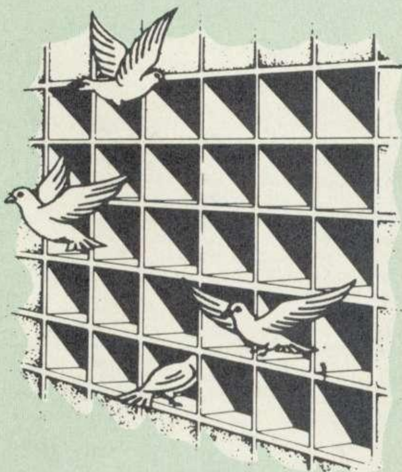
SPECIAL PRICE to our Customers

# £119

(Price includes COMMSTAR ROM & comprehensive manuals)

Nightingale Modem without software **Only £99**
COMMSTAR ROM package only **£29**
(P&P on modem £2.00)
Auto Dial/Auto Answer Board **£48**
Auto Dial Utilities Disc **£9.50**
OBBS Bulletin Software **£20.00**

## DATABASE MANAGEMENT SYSTEMS



## DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

On disc at **Only £17**

(Please specify 40 or 80 track when ordering)
(Please write in for technical specifications)

## FILE-PLUS

File-Plus is a powerful database for the BBC micro with many advanced features. Largely menu driven, File-Plus is provided on a 16k ROM with some extra utilities on disc. Features included are detailed below:

- Flexible full screen form layout.
- Built in File Query Language (FQL).
- Printer Output.
- Arithmetic operations in FQL.
- Looping in FQL.
- Number range of +– 9999999999.9999.
- File linking allows files over different drives.
- Multiple forms allow selection of displayed data.

**Only £32**

(Please specify 40T or 80T disc

## DATAGEM

Gemini's 24K ROM based DATABASE Management System

Special Offer: **£67**

**Continued →**




Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:
● Simply type *NLQ80/100 and a single VDU code to use NLQ print.
● NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
● Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
● Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

**Only: £25**

## VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

**£7.00**

## THE NLQ DESIGNER

The Kaga Taxan KP810 and KP910 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

A 40/80 track format disc containing 3 example fonts is included in the package.

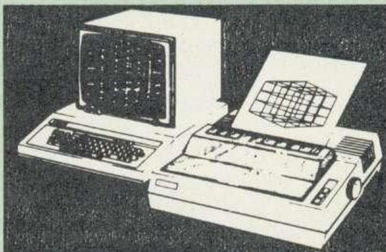
(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

NLQ DESIGNER & FONT DISC **£25**

INDIVIDUAL Preprogrammed FONT ROMS **£15**

(Please write in for further details on both the NLQ DESIGNER and the individual font ROMs available.)
Now available . . .
Centronics GLP printer, additional font ROMs.
Price **£15**
(Please write in for full details).

## DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

*Practical Electronics, May 1985*
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

*The Micro User Feb. 1985.*
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £24 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers: CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/200/400, etc. etc.
Price including comprehensive manual

**£25**

## VIEW

VIEW WORDPROCESSOR 2.1 .................. **£46**

## VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only **£60**

## HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

**£49**

**VIEWSHEET (Acornsoft) £49**

**VIEWSTORE £49**

**Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP**

**Only £10**

**VIEW DRIVERS FOR JUKI & BROTHER PRINTERS**

**Only £10**

**VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED**

**(Officially approved by Silver Reed)**

**Only: £10**

## BEEB PRINTER ROM




This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.

★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.

★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.

★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.

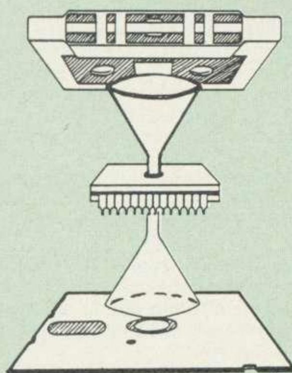
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.

★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

**Price: £24**

## TRANSFEROM

**(Tape to Disc Utility)**



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

After months of top secret development, we are now able to supply details of this advanced and sophisticated utility ROM for the BBC micro. Just look at the features:

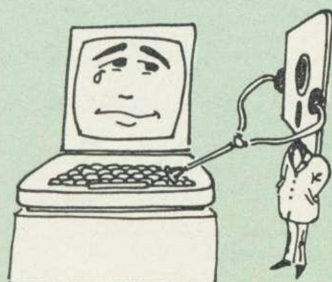
- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

**£25.00**

## DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

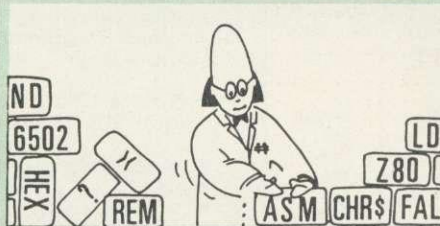
**Continued**

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

**Only £20.00**

## ROMAS

### THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!




ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

### The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

## ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version

SPECIAL OFFER ONLY **£43**

## ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

## THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

## ROM-SPELL

"way ahead of any competition"




ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Don't settle for less. Buy the best.

ROM-SPELL costs only **£25**

(Please state 40 or 80 track disc)

## DISC EXECUTOR

**Disc Executor** is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10** (40 or 80 track)

## BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.
Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

(Write in for technical details.)

**£24**

## DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.
Please write in for technical details.

ONLY **£16**

**Continued** →

# The ULTIMATE DFSs for the BBC MICRO

## WATFORD TOPS THE DFS CHART

**Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.**
**In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)**
**To celebrate the occasion, we are offering Watford's complete Disc Interface Kit at only £56 and the Double Density Unit at £58.**

*Just compare the features:*

| Features | Acorn 1.20 | Watford Single Density | Watford Double Density |
|---|---|---|---|
| Max nos. of files per disc side | 31 | 62 | 62 |
| Max disc capacity | 800k | 800k | 1440k |
| Tube compatible | Yes | Yes | Yes |
| Built-in Editor | No | Yes | Yes |
| Built-in Formatter | No | Yes | Yes |
| Built-in Verifier | No | Yes | Yes |
| MRUN a file | No | Yes | Yes |
| MLOAD a file | No | Yes | Yes |
| Extended RENAME | No | Yes | Yes |
| Selective COPY | No | Yes | Yes |
| Default file name | No | Yes | Yes |
| Disc space distribution | No | Yes | Yes |
| 40/80 Software Switchable | No | Yes | Yes |
| Wide catalogue | No | Yes | Yes |
| Close open files | No | Yes | Yes |
| Improved OPENOUT | No | Yes | Yes |
| Copy between densities | N/A | N/A | Yes |
| OSWORD &7F | Yes | Yes | Yes |
| Full entry point compatibility | Yes | Yes | Yes |
| Retain information over a break | 1.20 partial | 1.43 Yes | 1.53 Yes |
| Games compatibility | Yes | Yes | Most |
| Econet file server | Yes | Yes | Yes |
| Econet station | Yes | Yes | Yes |
| Full wildcard facilities | No | Yes | Yes |

## WATFORD's & ACORN's SINGLE DENSITY DFS

*Watford's popular and widely acclaimed DFS has now been available for two years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).*

**PRICES**

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£56**
- *Acorn's DFS Kit complete* **£56**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**

*(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)*

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS* **£16**
- *ADFS* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

## WATFORD's DOUBLE DENSITY DFS INTERFACE

*The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!*

*The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.*

**PRICES**

- *Complete DDFS Kit incl. fitting instructions* **£58**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

# The Watford Electronics DDFS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.

Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.

Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation. Just compare the features below with those offered by the Standard DFS:

- SINGLE or DOUBLE DENSITY operation. Double Density operation gives 80% more storage.

- Automatic detection of density for operations.
- 31 or 62 file catalogue with automatic catalogue size detection.
- Files can be up to FULL size of disc (360k) due to extension bit.
- Multiple file rename with FULL wildcards (even more powerful than those offered by the Standard DFS on it's *COPY operation!)
- *COPY with FULL wildcards; not the normal Acorn ones.
- Selective *COPY operation, with FULL wildcards.
- *COPY, *MOVE, *BACKUP, etc, over densities, 40/80.
- Status Display of open files (handle, full filename, pointer, extent and access type).
- Close all open files with a single * command.
- Built in single and double density verify routine.
- Built in single and double density sector editor.
- Read and WRITE in 40 track discs on 80 track drives.
- 40/80 switching drive independent.
- 40/80 switching automatically performed if needed.
- Built in formatter allows for mixing of density, catalogue size, 40/80 track and 40/80 switching.
- MLOAD and MRUN commands help run tape files from disc.
- Econet Level II file server capability Econet work station capability.
- Extremely powerful 8271 emulation for loading games, etc.
- Comprehensive OSWORD &7F emulation.
- Default filename system, useful for program development.
- Full width wide catalogue display in 80 column modes.
- Extended *LIB specifications.
- Optional preceding letter on * commands to avoid ROM clashes.
- List of sector gaps unused on disc.
- Full retention of open files over Break.
- Full retention of drive settings over Break.
- Full retention density settings over Break.
- Extended read filenames (via extended OSGBPB functions).
- Automatic sector skewing during formatting.
- Assumes last density for next disc access for speed.
- Read drive of last *RUN / *LOAD operation.
- Load ambiguous filename for convenience.
- Improved space allocation for OPENOUT.
- Invalid execution address (&FFFFFFFF) in *RUN causes *EXEC of file.
- Extended *HELP implementation shows syntax of individual commands.
- Extended error checking on operations.
- Catalogue shows number of files in catalogue.
- 40/80 stepping state displayed in catalogue.
- Catalogue shows catalogue size.
- Catalogue shows number of tracks.
- Default filename displayed in catalogue.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.

Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.

The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £35 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!

Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

BBC B+ DDFS **£25**
(Price includes comprehensive manual)

## Quality Disc Drives from Watford Electronics

*To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.*

*The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".*

*The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).*

*With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them. Users of Acorn's DFS will find that they need to pay the extra for switchable drives if they wish to use 40 track discs in an 80 track drive.*

*The drives we supply are fast (3ms track to track, 15ms settle), quiet and have a low power consumption (average well under 1 amp). Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

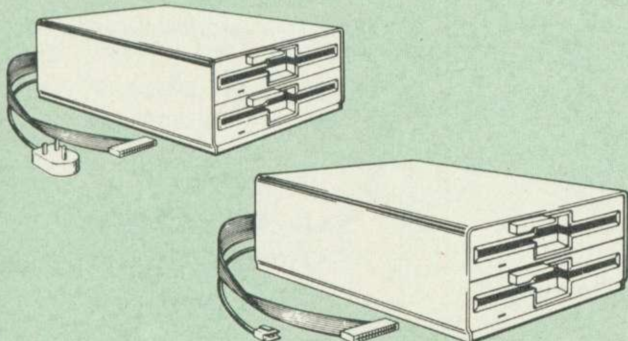
*Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.*

### Names you can trust, at prices you can afford!

*If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.*

*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!*

*All disc drives advertised here will operate in double density mode with the appropriate interface and software.*



| Capacity | Drives without P.S.U. | | Drives with P.S.U. | |
|---|---|---|---|---|
| | Single | Twin | Single | Twin |
| 100K (180K) | CLS100 £76 | | CS100 £89 | |
| 200K (360K) | CLS 200 £76 | CLD200 £140 | CS 200 £89 | CD200 £145 |
| 400K (720K) | CLS 400 £78 / £79 CLS400S | CLD 400 £140 | CS 400 £98 / £99 CS 400S | CD400 £145 |
| 800K (1.44M) | | CLD800 £158 / £159 CLD 800S | | CD 800 £175 / £179 CD 800S |
| Securicor carriage on Disc Drives £5 | | | | |

*Prefix* *C = Cased Drive*
*L = Less PSU*
*S = Single*
*D = Double*

*Suffix* *S = 40/80 Switchable*

*e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).*

## MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

**£5.95** (Book No VAT)

## 3M – DISKETTES

*Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.*

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£12**
- *10 × 5¼" D/D 40 Track Diskettes* **£17**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£22**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£23**

- *10 × 3" S/S D/D 40/80 track Discs* **£37**
- *10 × 3" D/D D/D 40/80 track Discs* **£45**

Buy 2 packs of any of the above Diskettes & qualify for a FREE Egon Ronay's "JUST A BITE" Guide.

## TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

**DON'T SETTLE FOR LESS, BUY THE BEST**

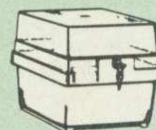
- *10 ×* **M4** *S-S D/D 40 Track Discs* **£11**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£14**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£19**

## DISC ALBUMS

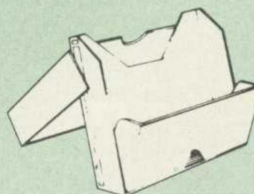
Attractively finished in beige leather-look vinyl, these conveniently store upto 20 Discs. Each Disc can easily be seen through the clear view pockets. **£4**

## LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



M35 - holds upto 40 discs **£10**
M85 – holds upto 95 discs **£12**



## PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£1.80**

## FLOPPY HEAD CLEANER KIT

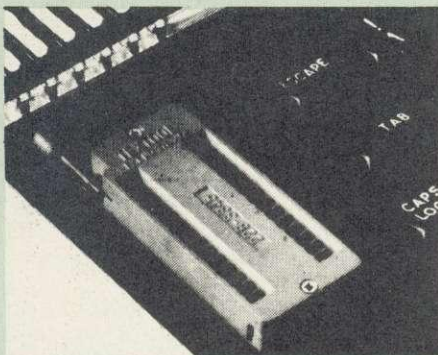
The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. **£8**

## DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.25** Twin (with PSU) **£3.90**

**Continued** 

## SIDEWAYS ZIF SOCKET




Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.
- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£15**

## 16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Introductory offer: **£29**

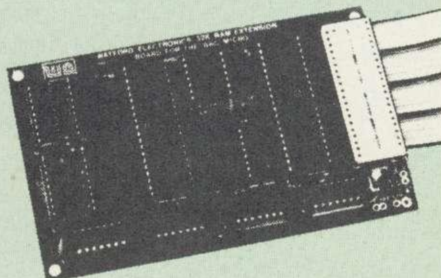
### Optional extras

READ and WRITE protect Switches **£2**
**BATTERY BACKUP £3**

# 32K

## SHADOW RAM-Printer Buffer

### Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in text in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only 12K Buffer can be used in Wordwise or Wordwise+ because of the way these softwares are written. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.
- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

## Only: £59

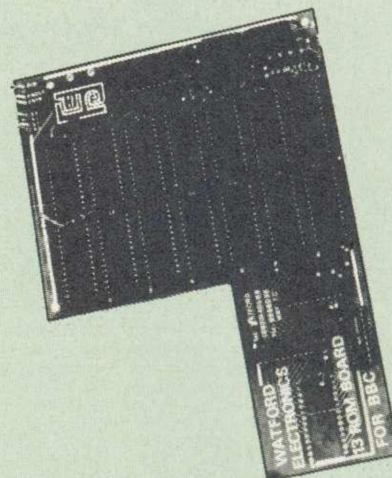
(Price includes a comprehensive manual and the ROM)

### SPECIAL OFFER

Watford's 32k RAM CARD plus Computer Concept's new WORDWISE PLUS Wordprocessor ROM Package.

At an incredibly low price of Only **£69**

## Mk-3 13 ROM SOCKET EXPANSION BOARD




- Increase BBCs capacity for ROMs from 4 to 16.
- Easy installation; simply plug in with only 5 wires to solder.
- Minimal space needed.
- Compatible with our DDFS, RAM Card, Torch card, 2nd Processors, etc.
- Advanced low power chips keeps power consumption to a minimum.
- Very versatile Socket 14 can take 2716, 2732, 2764, 27128, 6116 and 6264 chips.
- *LOADs or writes in the region &8000 to &BFFF are automatically directed at the RAM.
- Auto-write protect line makes RAM look like ROM.
- READ protect line which makes socket 14 "vanish" – useful to get out of software crashes.
- On-board battery back-up option with a high speed charging circuit.
- Supplied ready-built and tested, complete with fitting instructions.

**Price: Still Only £30**
**Ni-cad 'PCB' Battery £3**

## SOLDERLESS SIDEWAYS ROM SOCKET BOARD

Following the success of our 13 ROM SOCKET BOARD, we are proud to announce a new addition to our range – the New Solderless Sideways ROM Socket Board.

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

**Price: Only £32**
Battery backup fitted **£35**

# Watford ROM/RAM CARD

## A must for all serious users

Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Write protect for ALL RAM.
- Master write protect for all sockets.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- Fast *BACKUP via sideways RAM.
- ROM to RAM load and save facilities.

The RFS (RAM FILING SYSTEM) can utilise up to the full 128k of RAM (with the RFS in CMOS RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

**INTRODUCTORY PRICES:**

- ROM/RAM card with 32k dynamic RAM .. **£45**
- ROM/RAM card with 64k dynamic RAM .. **£69**
- ROM/RAM card with a massive 128k dynamic RAM .......... **£109**

**OPTIONAL EXTRAS:**

- 16k plug-in Static RAM kit .......... **£9**
- Battery backup .......... **£2**
- Read and Write protect switches .......... **£2**

Complete ROM/RAM board (all options installed) .......... **£125**

# *Le Modem*

### The MODEM from Watford

*At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 UK and BELL (USA) are all supported.*

*The features that make Le MODEM such good value are:*

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *BT Approval applied for.*

Launch Price: Only **£89** (carr £3)

(Price includes Software ROM, Cables and Manual)

**NEW**

## GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£49** (£3 carr)

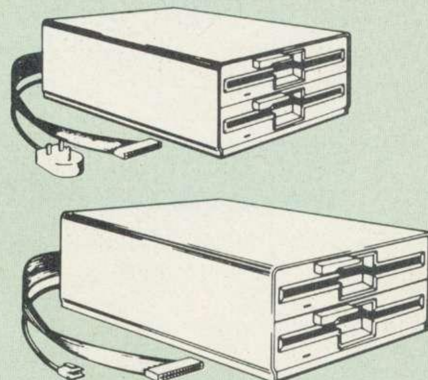


## CHRISTMAS GIFT VOUCHERS

Following numerous requests from you the customers, we have at last introduced our GIFT VOUCHER service. The Vouchers are available in £5; £10 & £15 denominations and are an ideal answer when faced with that problem of what to give for that special Birthday/Christmas gift. Simply send your credit card number or your cheque for the amount of Vouchers you require and we shall send you these attractive Vouchers. (There is a 50p handling charge on any amount.)



## CHRISTMAS DISC DRIVE OFFER



Watford Electronics has always been renowned for bringing high quality products to the consumer at realistic prices.

For the Christmas period, Watford is offering an even better deal on their top quality slimline MITSUBISHI DISC DRIVES for the BBC micro.

Packaged in matching decor the BBC micro, these superb disc drives are an ideal complement to any DFS on the BBC. Backed by a twelve month warranty from Watford, UK's largest distributors of BBC micro peripherals. You can be sure of a great deal from Watford.

The following 40/80 track switchable Disc Drives are being offered at rock bottom prices. The price includes a Utilities Disc. (For technical specification, please see the opposite page.)

- CLS400S Single 40/80 track switchable Disc Drive, cased with cables **£79**
- CLD800S Twin 40/80 track switchable Disc Drives cased with cables **£159**
- CS400S Single 40/80 track switchable Disc Drive cased with cables & Power Supply **£99**
- CD800S Twin 40/80 track switchable Disc Drives cased with cables & Power Supply **£179**

**BUY NOW & SAVE £ £ss . . .**

## Versatile BEEB SPEECH SYNTHESISER Unit




The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

**SPECIAL PRICE £32**

## LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

**Only: £55**

Continued →

## COMPUTER CONCEPT'S ROMS

| | |
|---|---|
| ACCELERATOR | **£52** |
| CARETAKER Basic Utility | **£27** |
| Graphics ROM | **£26** |
| Disc Doctor ROM | **£26** |
| TERMI | **£27** |
| COMMUNICATOR | **£58** |
| SPEECH ROM | **£26** |

## Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER: **£32**

## Wordwise plus

**£45**

FREE FREE FREE

This month we are giving away absolutely FREE, the superb Word-Aid ROM worth £16, with every WORDWISE PLUS package bought from us.

## Word-Aid

### The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Price; Only **£16**

## HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

**£5**

## SHEET

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

**£45**

## INTER-CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

**ONLY: £30**

**These ROMs form part of the first and only truly integrated range of programs for the BBC. Up to 16 sets of data can be stored in memory at once and data can be transferred directly and simply between programs, e.g. from sheet to sheet, or sheet to chart, or word processor to sheet etc., etc.**

**INTER-WORD and INTER-BASE will follow shortly to complete this suite of programs.**

**P.S. The Watford 32k shadow RAM board is an ideal complement to these programs, allowing them to operate in the 80 column screen modes with NO reduction in memory.**

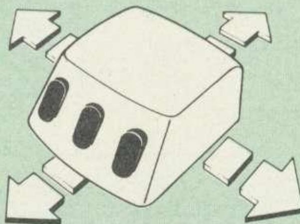
## SPECIAL OFFER

Watford's 32k RAM CARD plus Computer Concept's new WORDWISE PLUS Wordprocessor ROM Package.

At an incredibly low price of Only **£69**

# *THE AMX MOUSE*

The AMX Mouse needs no introduction. It is simply the best.



**Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.**

**ONLY: £67.95**

We are giving away the sophisticated **COLOUR ART** Software package **ABSOLUTELY FREE** with every purchase of the AMX Mouse from us.

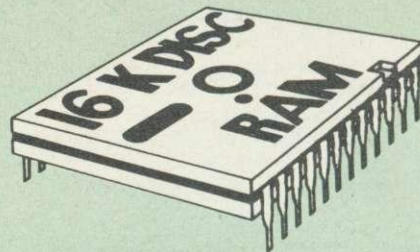
| | |
|---|---|
| AMX DESK Package | **£19.00** |
| AMX UTILITY Package | **£11.50** |
| AMX SUPERART Package | **£43** |
| AMX PAGE-MAKER Pack | **£43** |
| AMX 3D ZICON Disc | **£21** |
| AMX Database Disc | **£21** |
| AMX XAM Educational | **£21** |

## COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really brings those pictures alive. Not with just any colours, mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

Price **£10**

(please specify 40 or 80 track disc when ordering)



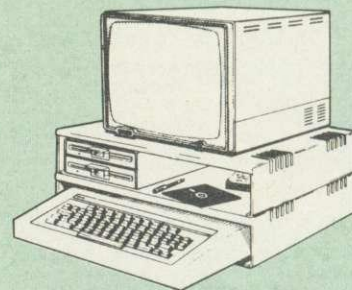

This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
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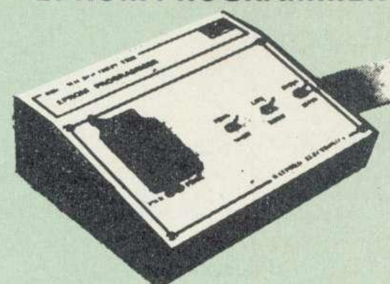
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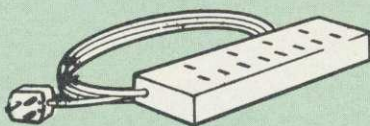
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# SPECTRAMANIA CRAZY

**The Smiffs are out to get you in Spectramania, our fast and furious game for you to type in and play. Just guide Ray Robot around the Spectramaze to success**

*David Acton*

Spectramania is a fast, arcade-style game set in the ever-changing 'Spectramaze'. Your task is to guide Ray Robot around the multi-coloured labyrinth, changing the colour of the blocks as you go, until the whole maze is the target colour.

To make life difficult, you are not alone in the Spectramaze. The evil Smiffs are hot on your tail, trying to trap you at every opportunity. And beware – their numbers increase as the game progresses!

Some help is provided however, in the form of two special pills which appear at random time intervals. First there is the A-U pill which, when consumed, will freeze the Smiffs in their tracks to give you vital extra seconds. Then the Power pill appears from time to time – eating this will give you the ability to devour the Smiffs to gain bonus points. A bar at the top of the screen displays the time remaining before the effect of a pill wears off.

There are five levels of difficulty. You begin the game, naturally, on level one, where you need only change the colour of each block once to complete the maze. Having progressed through four rounds at this stage, you move up to level two. Here you must change each block twice before your task is complete.

Level three requires different tactics – you need only alter each block once, but treading on a block of the target colour will return it to its original shade.

In level four you must change the colour twice, but treading on a block of the target colour will turn it back to the second colour of the sequence.

Finally, you are faced with level five – the ultimate challenge! Just like the previous level, two changes per block are required but if you step on a block of the target colour it will go right back to the first colour of the sequence!

Your score is displayed at the top of the screen during the game, together with the current all-time high score and the number of lives you have left. The target colour for any particular round is displayed in the centre of the screen.

Controlling Ray is simple – use the 'Z' and 'X' keys to move him left and right and the ':' and '/' keys to send him up and down.

## How it works

The game is written in three parts. Listing 1 on the yellow pages performs the following functions:

- Defines sound envelopes (lines 80 to 110).
- Sets up a table of screen addresses (lines 150 to 160).
- Stores character data and maze data in the memory for the main program to use (lines 170 to 190).
- Chains listing 2 (line 250).

Listing 2 contains all the assembly language used in the game. HIMEM and LOMEM are set to the values of &8000 and &7A00 respectively in line 60. This causes the variables used in the program to be stored in the screen memory, leaving enough space below the screen for the program to operate in.

Variables are assigned values in lines 70 to 180. Table 1 contains a summary of the functions of the variables used in listing 2. The assembly language itself stretches from line 210 to line 6970.

The machine-code produced is stored under the screen memory at &2A29. Each of the



The 'Spectramaze' is the scene of the action – the object is to change the colour of the blocks

more important machine-code routines' functions is given in table 2. When this code has been assembled listing 3 is then chained.

It's worth explaining how some of the special features of the game are achieved – I'll start with the 'double-plane' graphics. As you play you'll notice that Ray and the Smiffs glide across blocks of various colours, as if on a completely separate plane from that of the maze. As you may know, each pixel on a mode 2 screen has its colour determined by four bits. To achieve the two-plane effect the two most significant bits are used for the foreground colour and the remaining two for the background shade. This system allows fast animation with a multi-coloured background.

Characters are displayed by transferring blocks of character data from a table to the screen. This table begins at &B00 and is set up by listing 1 of *Spectramania*.

The maze itself is displayed using data stored in the table labelled map% in listing 2. Each block of the maze is represented by one byte of the table. Four bits of each of these bytes contain information about the walls surrounding a given block. Each wall is represented in the table by a single bit which is set if the wall exists. Two more bits are used to represent an invisible arrow pointing to an adjacent block. The Power pill and A-U pill follow these arrows, as do the Smiffs when they're not chasing you.

Many games require 'intelligent', computer-controlled characters and *Spectramania* demonstrates how this can be achieved fairly simply.

| Variable | Function |
|---|---|
| ad, ad2 | Stores for screen address |
| rd, rc | Memory set aside for the generation of pseudo-random numbers |
| map% | Position of table containing information about walls of maze and routes followed by Smiffs |
| mcol% | Position of table containing the colour of each maze block |
| cx, cy | Position of tables containing screen co-ordinates of Smiffs |
| cmx, cmy | Position of tables containing maze co-ordinates of Smiffs |
| sw, sw2 | Position of memory areas set aside for the generation of sound effects |
| csx, csy, csmx, csmy | Position of tables containing starting positions of the characters in the game |
| sc | Position of three bytes containing score. Note that the score is stored in Binary Coded Decimal (BCD) format |
| lvl | Byte containing level of difficulty |
| targ, tot | Two bytes used to determine if a player has changed all the blocks to the target colour |

**Table 1. Major variables used in listing 2**

Each Smiff is controlled separately. If it can home in on Raymond horizontally then it will. If not, it tries again vertically. If unsuccessful this time, it follows the invisible path of arrows until it has passed a randomly-selected number of path junctions. Then it resumes its attempts to home in.

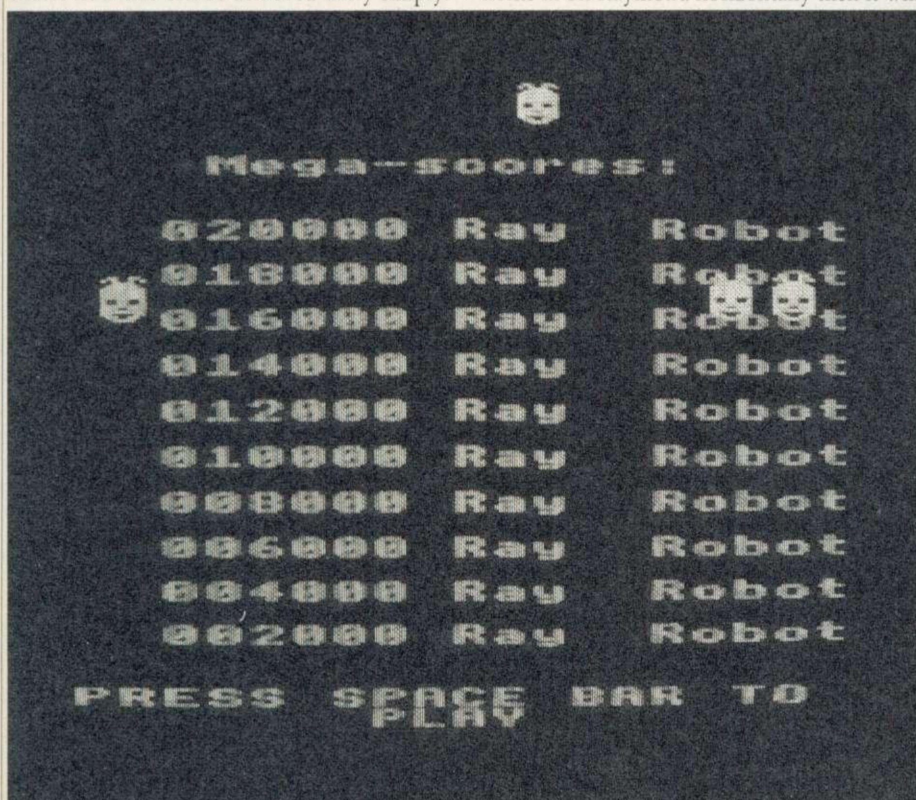
This system can be extended to a variety of games and is particularly valuable because the computer-controlled characters never get stuck in corners, a common problem when writing maze-type games.

So that there is a random element in the game, a pseudo-random number generator is used. The same idea is employed in Basic when the RND function is used. By applying a simple algorithm to a block of four bytes, random numbers can be simulated. The routine rand (lines 1440 of listing 2) performs this function here.

When typing in the three listings refer to the notes on page 107 of the yellow pages.

In a future issue we will upgrade *Spectramania* by adding extra mazes and other new and exciting features.

*The listings you need to type in to play Spectramania are on yellow pages 107 to 112*



**The Spectramania roll of honour: if you score over 2000 you're doing well, but keep trying!**

| Routine | Function |
|---|---|
| cad | Calculates screen address from X and Y co-ordinates |
| block | Displays block with given co-ordinates in X and Y |
| vert | Displays a vertical wall at a given position |
| hor | Displays a horizontal wall at a given position |
| key | Checks for a particular key being pressed |
| rand | Generates pseudo-random number |
| score | Displays score |
| adsc | Adds a given number of points to the score and displays the result |
| sound | Generates a sound with given parameters |
| vd19 | Redefines a colour (equivalent to VDU 19, X, Y, 0, 0, 0) |
| char | Displays a given character |
| del | Deletes a given character |
| main | The main game |
| change | Changes colour of block |
| reset | Resets several variables to their starting values |
| bar | Displays a bar of a given length and at a given position (used when P or A-U pill is consumed) |
| spec | Handles appearance and movement of the Power and A-U pills |

**Table 2. Machine-code routines from listing 2**

# DIY LOGO WORDPROCESSOR

**It's not what you say it's the way that you say it, and this home-made Logo wordprocessor could speak admirably for you**

*Joe Telford*

The wordprocessor more than any other tool – mechanical, electronic or computer-based – provides people with the means to say what they want, to rephrase and edit, to preview and print out. Indeed, it offers the chance for everyone's writing to be free from the fetters of the mechanical handwriting skill, and for the professional writer it means the removal of the paste-pot and scissors or the re-type.

Whether in school or business, the wordprocessor is one of the most useful tools available. However, many readers will have purchased a purpose-written wordprocessor, such as *View, Wordwise* or *Edword.* In this article I'll demonstrate the requirements of a wordprocessing system, and produce a simple text formatter which can be used with the Logo language.

Despite the fact that there are at least four very good implementations of Logo available for the BBC micro, to my knowledge only Logotron provides users with the inside information on where things live in the system and it was the new extension disc to this company's Logo which confirmed it as my choice for this article. It should not be difficult to transport the finished product between Logos – I'll show you how later.

## What's in a wordprocessor?

A wordprocessor is made up of two parts, editor and the text formatter. Many wordprocessors embody these two functions in a single package, so that what is seen to be typed on screen is printed in the same format. However, because all the Logo editors I have come across are unaccessible to Logo during the editing time, this real-time formatting approach cannot be used with our package.

One wordprocessor which receives much praise is *Wordwise* from Computer Concepts. The editor part works in a similar way to the Logo Editor, and so the simplicity of *Wordwise* provides a useful frame of reference for our wordprocesssing system.

The first stage in producing a wordprocessor is to specify what it will do – see table 1 for details.

Figure 1 on page 80 is a function keystrip for the edit section, and may be cut or copied from the page and used at any time during text entry to perform the functions indicated. Here are the details of the full range of editing keys.

**Edit section**

1. Edit text (all available in the Logo editor)
   a) Enter text from keyboard
   b) Delete
   c) Insert
   d) Find
   e) Replace
   f) Cut
   g) Paste
   h) Copy and Move
2. Load new text (New from extension disc)
3. Save text (New from extension disc)

**Format text**

1. Read text from editor
2. Select a position for the left margin
3. Select a line length
4. Ensure that each line is less than or equal to the line length
5. Select a page length in lines
6. Feed between pages
7. Select a top of page gap in lines
8. Perform this feed at the start of a page
9. Select a bottom of page gap in lines
10. Perform this feed at the end of a page
11. Select the number of spaces between lines

**Table 1.Specifications for a wordprocessor**

## The editing keys

The cursor keys act as usual, moving the edit cursor one space up, down, left or right. When used in association with the Shift keys the cursor moves between top and bottom of the current page, and from start to end of the current line. Obviously the cursor keys can be used in close association with function keys f3,4,5,6 and 7 which perform more powerful cursor movements.

The delete key erases the character to the left of the cursor and then closes up the space. Function key f0 erases the character above the cursor then closes up. You can delete the entire line to the right of the cursor with f1.

To 'cut and paste', the erased line caused by fl is fed into a one line 'cut buffer' where, if left, it will be discarded. However, if function key f2 is pressed, the contents of this buffer will be inserted at the current cursor position. This allows block move and copy facilities.

To perform a block move, first position the cursor at the beginning of the line which needs moving. Hit fl. Now move to the destination position. Hit f2. The line will then reappear in the new position.

To do a block copy place the cursor at the beginning of the line to be copied. Hit fl, then f2. Now move to the destination position. Hit f2. A copy of the line will then reappear in the new position.

The 'find' facility can be used as follows. Pressing f8 will prompt the user with the word FIND: and any string can be entered. On pressing Return, the cursor will move to the first occurrence of the word and amendments can be made. If Copy is pressed and then f8, the next occurrence of the string will be found.

You can 'find and replace' words by pressing f9 which will prompt the user with the

word FIND: and any string can be entered. On pressing Return, you are prompted with REPLACE: and the alternative string should be typed. The cursor will move to the first occurrence of the word and replace it with your alternative. If Copy is then pressed and f9 is hit again, the next occurrence of the word will be replaced.

Remember these searches are only performed from the current cursor position – if the cursor is not at the top of the text, it's possible that some items will not be found.

To edit a text file in memory simply type EDIT. To exit from the editor press Escape.

### Logo extension disc

On the Logotron extension disc there is a file called "UFILES which contains extra primitives to manage the Logo editor. After typing *LOGO the next command should be USE "UFILES and this will install the extension. Not all of the facilities of UFILES are needed for our wordprocessor, so I'll just comment on the ones which are.

To load a textfile from disc to the editor type EDLOAD "filename. Remember to maintain the single quote of Logo.

1. *LOGO
2. USE "UFILES
3. .SETEDITOR 4000
4. SETMODE 3

(NB. These can be fed into a !BOOT file to start up the system)

5. EDLOAD "letter3
6. EDIT
7. Editing is now performed
8. ESCAPE
9. EDSAVE "letter4
10. DEFAULTS
11. PREVIEW
12. PRINTOUT

**Table 2. A typical wordprocessing session**

To save a textfile to disc from the editor type EDSAVE"filename.

To alter the space allocated to the editor type .SETEDITOR n where n is a decimal number indicating the size in bytes of the editor. Remember to use the full stop prefix as shown in the command. This command must be given at the beginning of a session or a LOGO NOT FRESH message will occur if you try later.

Typing PRINT .EDITOR prints the start and end addresses of the editor. This is most useful when it comes to reading the text into the formatter.

Writing the text formatter is not too arduous, and can be split into a number of sections. One of the best ways to start to specify a Logo microworld is to write down the commands which you would like to use to interface to your application. In this simplest of text formatters, I chose to mimic some of the *Wordwise* commands as set out in table 3.

All these commands should be issued outside the editor, and will continue in force during the whole of the PREVIEW or PRINTOUT command.

All the commands such as LL, LM, etc, are really just instructions to set Logo variables, which can later be compared to text counters in the main routines. In order to maintain their logical names, I simply wrote these routines as follows:

```
TO PL :n
 MAKE "PL :n
END

TO BP :n
 MAKE "BP :n
END

TO TP :n
 MAKE "TP :n
END

TO LS :n
 MAKE "LS :n
END

TO LM :n
 MAKE "LM :n
END

TO LL n
 MAKE "LL :n
END
```

Notice that the word MAKE creates a global variable called, say, LL and then places the contents of n into it (':' means 'the contents of'). Where does n come from? Well n is a value which you send to the routine. For example, in the line length routine LL 60, the value sent (ie, n) is 60.

The next stage is to set up a simple default command so that we don't need to type all these commands whenever we want to produce a standard piece of text. This is easy, because Logo allows the use of words within words. The default command becomes:

```
TO DEFAULTS
 LM 10 LL 60 PL 66 TP 8
 BP 8 LS 1
END
```

This only leaves the commands PRINTOUT and PREVIEW. If we accept that PRINTOUT is simply a hard copy version of PREVIEW then it can be written:

```
TO PRINTOUT
 VDU [2]
  PREVIEW
 VDU [3]
END
```

VDU commands in Logo need surrounding square brackets, and if two or more numbers exist in the VDU command, they should be separated by spaces (eg, VDU [2 1 14 3] which sends character 14 only to the printer).

This leaves us with PREVIEW. By the very nature of Logo, I have arrived at a single word which encapsulates the problem facing us. Its solution can only be achieved by breaking the problem down into smaller parts and solving each sub-problem as it arrives.

There are three main problems within PREVIEW. These are to set up the counters and other internal variables which the formatter will need; to move to the most appropriate start point on the first page to start printing; and finally to get and print the text.

We might show this by writing PREVIEW as follows:

```
TO PREVIEW
 setup
 feed :TP
 gettext
END
```

Notice that inside the TO . . . END sandwich there are three words in lower case. I always

| Command | Function |
|---|---|
| PL n | Sets page length to n lines |
| LM n | Sets start of text to n columns from left |
| LL n | Sets line length to n columns |
| LS n | Sets line spacing to n-l blank lines<br>(ie, LS 1 is continuous text and LS 2 is double spacing) |
| TP n | Sets number of blank lines at the top of page |
| BP n | Sets number of blank lines at the bottom of the page |
| DEFAULTS | Set up all the above to particular values |
| PREVIEW | Prints the text on the TV or monitor screen |
| PRINTOUT | Produces hard copy |

**Table 3. Wordwise commands to be mimicked by the Logo text formatter**

use lower case in Logo to indicate that a command is not a Logo primitive (ie, that it is a defined routine) and not something which would be used as a direct command.

Notice too, that the command 'feed' has a :TP following it. This is translated therefore as 'send to "feed" the contents of variable TP'. TP contains the number of blank lines at the top of the page. The routine which feeds a set number of blank lines can be represented as:

```
TO feed :n
 IF :n < 1 [STOP]
 REPEAT :n [PR []]
END
```

The first line checks for a 0 parameter and exits if this is found. STOP is the command which throws you out of a routine, back to where you came from.

Note that the IF command requires the TRUE result (IF n < 1 THEN TRUE RESULT) to be enclosed in square brackets. In our case, if :n is 1 or more then control passes to the next line and the contents of [PR [ ]] are repeated n times. Because PR [ ] means print a blank line, n blank lines are printed. This routine is used later to feed the blank lines at the bottom of a page.

The next sub-problem is to define the 'setup' command. This must contain all the global variables which need initialising at the start of every print run, and also to set up the display screen. In this simple formatter, only five important variables need initialising:

```
TO setup
 MAKE "ptr FIRST .EDITOR - 1
 MAKE "eof LAST .EDITOR
 MAKE "text []
 MAKE "ll 0
 MAKE "pl 0
 TS VDU [19 0 4 0 0 0 0 0 0]
END
```

The setup command defines the contents of 'ptr' to be the memory location before the start of the editor, and the contents of 'eof' to be the location of the end of the editor. Next it sets the list which it uses for the current line of text ("text) to be empty. Then it sets the current line length ("ll) to be 0 and also the current line number of the page ("pl) to be 0. Notice that in Logo any variable can contain a string (word) list decimal number or integer, without needing to be specially defined.

Finally the routine performs TS which selects Text Space on the display screen and a VDU 19,0,4,0;0;0; which produces a blue lined background.

I'm slowly approaching the main problem which is the acquiring and printing of text. The 'gettext' command can be specified most easily as get a line of text and print it. If there is no more text stop, otherwise repeat this specification from the beginning. This can be coded:

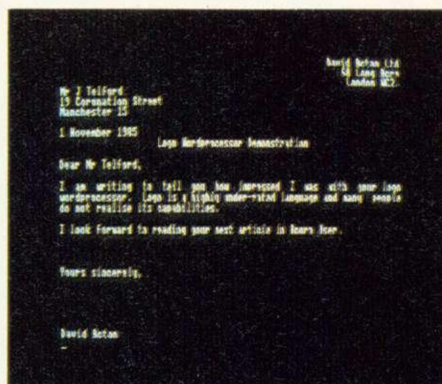
```
TO gettext
  getline
  IF :char = 0 [STOP]
  IF :ptr > (:eof - 1) [STOP]
[GET TEXT]
END
```

Notice that getline is the command which gets a complete line of text and prints it, while the IF command causes a stop at the end of text. This occurs when the contents of 'char' become 0 or when the pointer to the text gets to the end of the editor (eof). If neither of these alternatives occur, then [gettext] causes the process to recur. Notice that an IF statement can have both a TRUE result and a FALSE result and the format is:

IF <expression is true> [TRUE result] [FALSE result]

The main problem then is the reading from the edit buffer of a line of text and then printing it out. This routine is called 'getline; and its specification is:

1. Get a word from the editor.




**This wordprocessor can't improve your spelling!**

2. IF the word ends with a <CR> or end of text character <0> but the line length is not exceeded THEN output a sentence based on the current text line and the word in question. Clear the text line and exit the routine.
3. If the word ends with a <CR> or end of text character <0> but the line length is exceeded THEN output the current text line on one line and the word in question on another. Clear the text line and exit the routine.
4. IF the word ends with a space <32> THEN increment the current letter count in the line length.
5. Add the current word to the text line.
6. IF the letter count is greater than the line length THEN output all but the last word of the text line, update the text line by replacing the line with its last word. Exit the procedure.
7. IF 6 is false then repeat from 1 above.

This translates to a Logo equivalent which looks like:

```
TO getline
  MAKE "word getword
  IF AND ( :char < 14) ( :ll
< ( :LL + 1 ) ) [output :text
 output :word clrtext STOP]
  MAKE "ll :ll + 1
  MAKE "text SE :text :word
  IF :ll > :LL [output BL :t
ext update STOP] [getline]
END
```

Each of the written English lines of the specification maps to the equivalent line in the routine, with the exception that line 7 refers to the [getline] command at the end of the last IF statement. There are, however, a number of points which need expanding:

First the Logo construction:

SE: text :word

means make a sentence (Logo list) by adding the contents of 'word' to that of 'text'.

Next the expression:

BL :text

means take the complete sentence contained in 'text' apart from its last word.

The routine above includes a number of calls to other defined procedures. These are 'getword' 'output' 'clrtext' and 'update'.

The aim of the 'getword' routine is to return a word from the editor to the calling 'getline' routine. Because the routine returns a value, it is similar to a Basic function, and is regarded as a Logo operation rather than a command:

```
TO getword
  MAKE "ptr :ptr + 1
  MAKE "char .EXAMINE :ptr
  IF :char < 33 [OP "]
  MAKE "ll :ll +1
  OP WORD CHAR :char getword
END
```

The approach used is to increment the text pointer to the next character in the editor, then

| | |
|---|---|
| 1. | *LOGO |
| 2. | SETMODE 3 (NB These can be fed into a !BOOT file to start up the system) |
| 3. | LOAD "letter 3 |
| 4. | EDALL |
| 5. | Editing is now performed |
| 6. | CTRL-C |
| 7. | SAVE "letter 4 |
| 8. | EDIT (remove first line – see text) |
| 9. | ESCAPE |
| 10. | ERALL |
| 11. | LOAD "formatr |
| 12. | DEFAULTS |
| 13. | PREVIEW |
| 14. | PRINTOUT |

**Table 4. Wordprocessing without UFILES**

read that character into a variable called 'char'. The three 'control' characters found in the editor are ASCII 32 (a space), ASCII 13 (a carriage return) and ASCII 0 (the end of editor marker). These are checked for, and if found the search for the word is terminated, otherwise the character is added to the word undergoing construction using the expression:

OP WORD CHAR :char getword.

This expression calls the routine from within itself via the operation 'getword', and is a typical example of Logo recursion. When the word end is found, the OP (OUTPUT) command returns the letters of the words until finally the whole word is returned to 'getline'.

The output routine deals with printing each line of text. It begins by printing the indent to the left margin (if one exists) and then prints, without a carriage return, the line in question. This is via the TYPE :n command. Finally the line spacing is examined and line spacings of 0 or 1 line are regarded as meaning no blank lines between lines, while line spacings over 1 generate that number of carriage returns. After each new line, a command called 'checkpage' checks to see whether a new page should be initiated. The output routine is:

```
TO output :n
  IF :LM = 0 [] [REPEAT :LM
[VDU [32]]]
  TYPE :n
  IF :LS < 2 [PR [] checkpag
e STOP]
    REPEAT :LS [PR [] checkp
age]
END
```

The 'clrtext' routine simply blanks the variable 'text' and sets its length to 0:

```
TO clrtext
  MAKE "text [] MAKE "ll 0
END
```

The 'update' routine places the last word of the list 'text' into a newly blanked list and then resets the letter count to the length of this single word:

```
TO update
  MAKE "text LAST :text
  MAKE "ll COUNT :text
END
```

The 'checkpage' routine increments the current line counter and then checks this against the page length (including top and bottom spaces). If the counts match then the routine 'pagefeed' is called:

```
TO checkpage
  MAKE "pl :pl + 1
  MAKE "cl :pl + :TP + :BP
  IF :PL = :cl [pagefeed]
END
```

The 'pagefeed' routine calls the 'feed' routine twice, for end of page and for top of page. It ends after resetting the line counter to 0:

```
TO pagefeed
  feed :BP feed :TP
  MAKE "pl 0
END
```

## Wordprocessing without UFILES

If your Logotron extension disc is slow in arriving, fear not. It's possible, with a little patience, to convince the basic Logo system to work without the UFILES extension. First alter the 'setup' command:

```
TO setup
  MAKE "ptr 6401
  MAKE "text []
  MAKE "ll 0
  MAKE "pl 0
  TS VDU [19 0 4 0 0 0 0 0
0]
END
```

Note that the value 6401 is the address of the start of the editor on a standard BBC micro with DFS (the Basic equivalent is PAGE + 1). Now save the formatting routines with a command such as :SAVE "formatr

To get round the EDLOAD and EDSAVE commands, each textfile must be prefixed with a TO textfilename (and automatically an END line) in the editor, and then has to be installed in memory as a dummy procedure by leaving the editor with CTRL-C. This is only necessary for loading and saving. For printing, the editor should be left by hitting the Escape key, so that the title and END lines can be erased. To maximise on workspace, the formatting routines should only be loaded immediately prior to printing, and then erased with ERALL if further editing which will lead to a SAVE or LOAD is required. A typical session is shown in table 4.

Readers will no doubt improve on this simple approach to Logo wordprocessing. Certainly the next most important item to include in the formatter would be the facility to operate a range of embedded commands.

Joe Telford reviewed four versions of Logo in the May 1985 issue of *Acorn User*. These were: **Acornsoft Logo** at £59.95 from Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN; **Logotron Logo** by Logotronics at £59.95 from 5 Granby Street, Loughborough, Leics; **LSL Logo** at £59.95 from 316a Richmond Road, Twickenham Middlesex; and **Open Logo** by BBC Publications at £69.95 from 35 Marylebone High Street, London W1M 4AA.

*Next month Joe Telford examines the B+ and shadow RAM*

DELETE CHARACTER ABOVE
CUT
PASTE
NEXT PAGE
LAST PAGE
CENTRAL SCREEN
TOP
BOTTOM
FIND (REPEAT WITH COPY)
REPLACE

**Figure 1. Function keystrip for the edit section – cut it out or copy it**

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# INTO THE THIRD DIMENSION

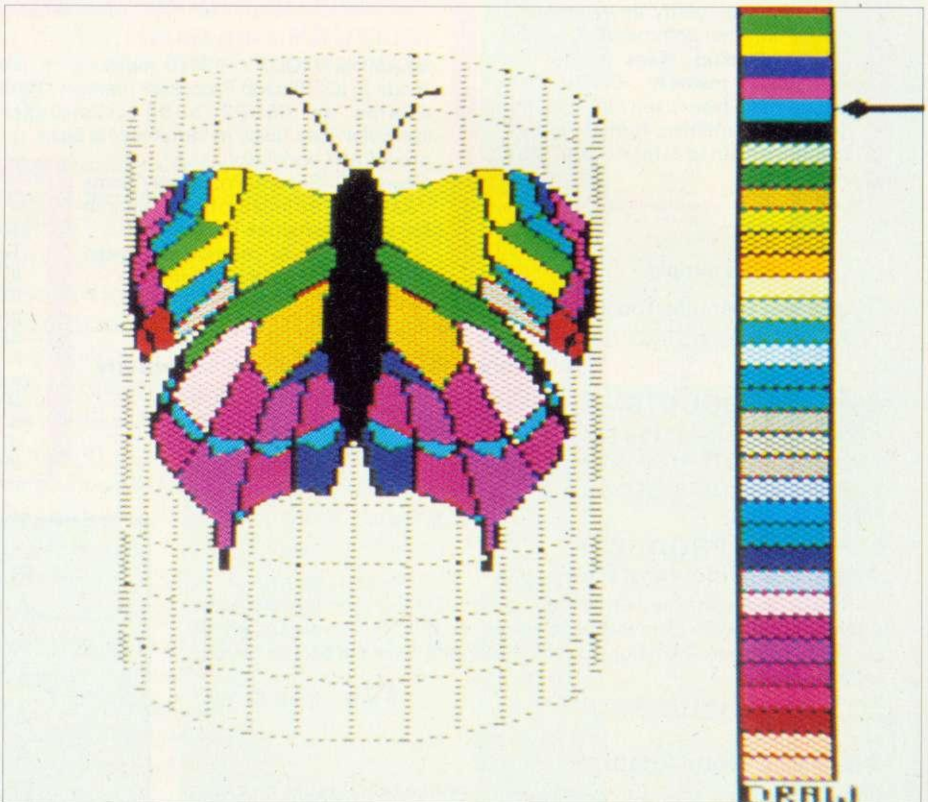
**Our four-part series on graphics concludes with a look at two ways of creating three-dimensional solids by the input of 3D data and with mathematical assistance**

*Jim McGregor and Alan Watt*

In this final article of our series we'll look at two methods of creating three-dimensional (3D) solids. First the input of 3D data and second the generation of solids with mathematical assistance. You need not concern yourselves with how to represent the data in a BBC or Electron, but if you're interested a convenient method is described in detail in *The Art of Microcomputer Graphics for the BBC Micro/Electron*.

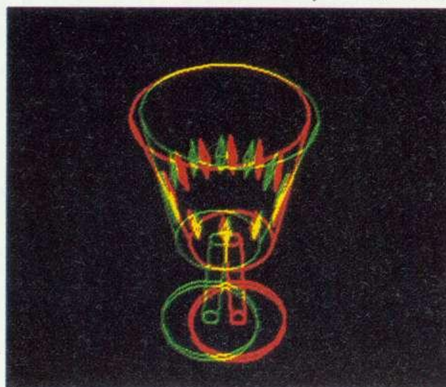
The creation of 3D data is one of the most diverse areas in computer graphics. Certainly the art of making realistic images of solids is a Cinderella area of computer graphics that has not improved as rapidly as other major fields.





The use of colour in non-linear transformations: the start co-ordinates of the colour fill sequence have been subject to the same transformations as the points in the motif

The difficulties are obvious. Whereas ways of viewing and shading surfaces are more or less universal to all models, the most convenient method of input or creation is highly dependent on the application. The most obvious approach – typing co-ordinates from a keyboard – is accurate but tedious. Most approaches are interactive, and the most sophisticated are based on ways that allow the construction of a solid from primitive elements such as cylinders, spheres, cubes, etc. Such methods are found in CAD (computer aided design) where a common 3D model may be a solid machine part, and this software is sometimes referred to as a graphics editor. It is analogous to a text editor which may take from different sources, such as the keyboard, stored fragments, etc, and allow the user to put a new piece of text together, then refine and change it. A graphics editor will allow a user to combine stored primitives, information from the keyboard, graphical details from a digitiser tablet or some other graphics input device. The model can be viewed as it is built up and refinements made to it.



A stereo image of a three-dimensional object

Another common graphics input technique is to sculpt 'free-form' surfaces (these are surfaces that cannot easily be defined by mathematical equations) from a keyboard. The surface is defined by 'patches' and as it is displayed the user can pull it in all directions, just as if it was a thin sheet of plasticine.

These techniques are beyond the scope of

this article. Graphics editors are complex and application-dependent, and interactive surface patching requires advanced mathematics. An easy and widely used technique that we shall look at is called 'lofting'.

Lofting means defining, via a digitiser tablet or some other interactive input device, a set of cross-sections of the object to be modelled. The best analogy is with a geographic map, where each contour traces the edge of a surface for a given height. If, for example, the object we wanted to define was a cone, then we would input a set of concentric circles of decreasing radii. In practice, of course, cones can easily be defined analytically, and lofting is used where mathematical definitions are difficult or impossible. The general program structure is:

```
FOR contour = 1 TO noofcontours
PROCinput_contour_at_ht(z)
z = z + interval
NEXT contour
```

Listing 1 on the yellow pages demonstrates this technique. It reads from a file (simulated by DATA statements) containing the contours, and uses a nested repeat-until structure. The program uses simple squares as contours. However, figure 1 shows the use of more complicated input, and a subsequent screen shot from the program.

An obvious disadvantage of this is that our 3D model is not in the form of surfaces, but comprises a collection of contours at different heights. Although the model is easy to plot in this form, it is not suitable for processing by a hidden surface algorithm, nor can it be used by a shading model, which requires a set of plane polygons. So, a surface has to be defined over the contours as a series of patches. This is called triangulation. We will adopt a straightforward approach to map our contour data into a collection of triangular surfaces.

Listing 2 incorporates a simple triangulation algorithm using a standard surface-vertex data structure (described in detail in the book). It operates on just two contours generated by the program, but is easily extended. The contours are semicircles of different radii. These are generated in the procedure PROCgenerate-contours. The lower contour is a semicircle of radius 150 at a height of 0. The upper one is of radius 80 at a height of 100. These contours are generated by sweeping a radius through 180° in 10° intervals. The radius and the interval are both randomly perturbed so that a 'jagged' semicircle is generated. This simulates the case of a general contour input from a digitiser. The vertices of these contours are loaded into the array 'vertex'. In more complex cases we need a pointer to the start of each contour.

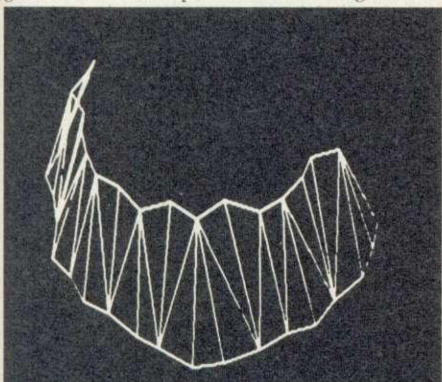


Figure 2. Output from simple triangulation algorithm

The other procedure we are interested in is PROCtriangulate. This defines a surface of triangular patches between the two contours loading the results into the array 'surface'. The output from the program is show in figure 2.

A number of commonly used convex bodies can be generated by sweeping a line through 360° in intervals of, say, 10°. The simplest of these is a cylinder. Cones and spheres can also be generated in this way although when a function, rather than a straight line, is swept we have the problem of triangulation again. This method is called rotational sweeping and is illustrated in figure 3, which shows a cylinder being generated by sweeping a vertical line through 360°. The method can be generalised so that the swept line follows a profile from a digitiser.

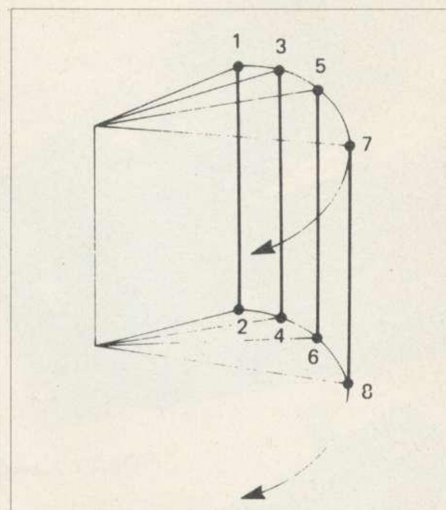
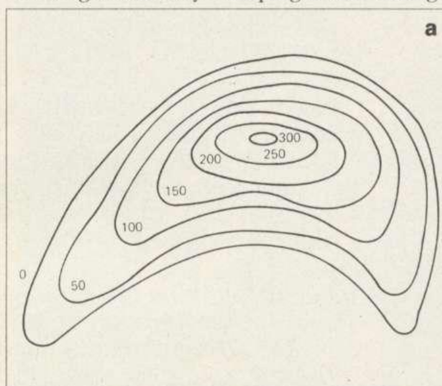



Figure 3. Generating a cylinder



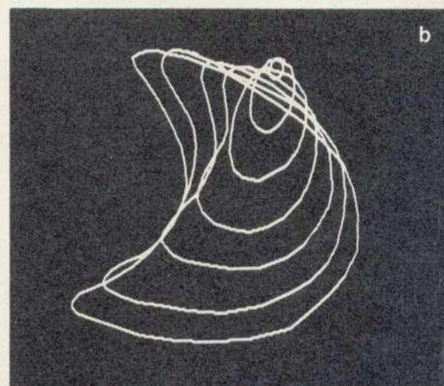
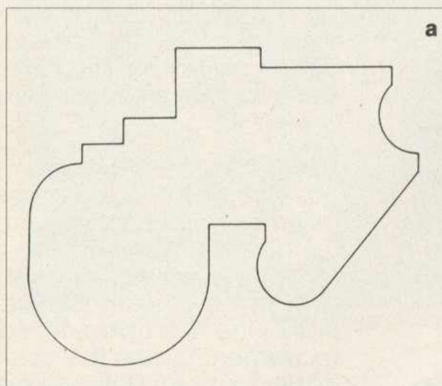




Figure 1. Lofting to input 3D data: a) object defined as a set of height contours; b) object as a 3D solid



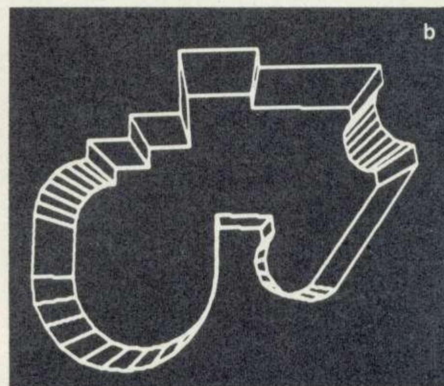



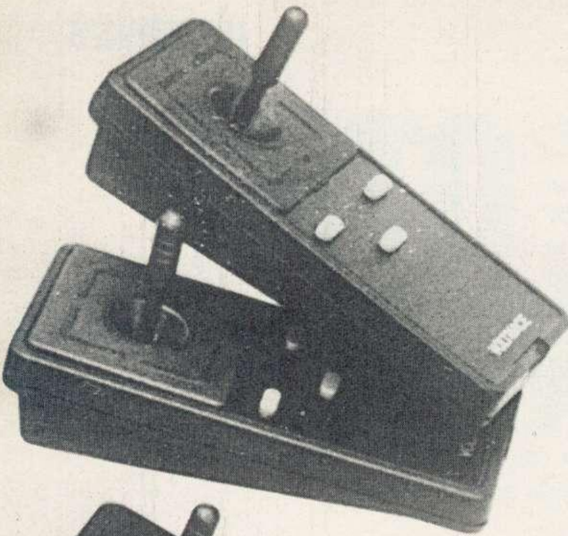

Figure 4. Constructing a 3D solid around a contour: a) input data; b) the object generated by the program

Listing 3 implements this idea using a simple L-shape which needs few DATA statements to describe it in the program. However, in general a file of data could be used, and a contour such as that shown in figure 4a could be input to the program. A 3D model is easily constructed by considering a duplicate contour at some height above the original. Figure 4b shows a view of this object as generated by a more general program.

## The wireframe wineglass

Using a selection of the above techniques we will now consider how to generate a particular 3D model – the wireframe wineglass. This also shows that for a particular model there is usually no best method or no single method. Listing 4 illustrates this point, as it contains a variety of techniques tuned to the particular-

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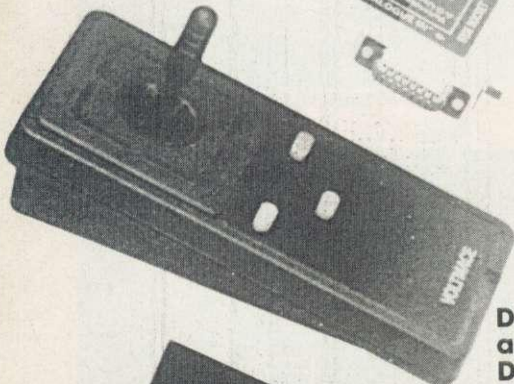
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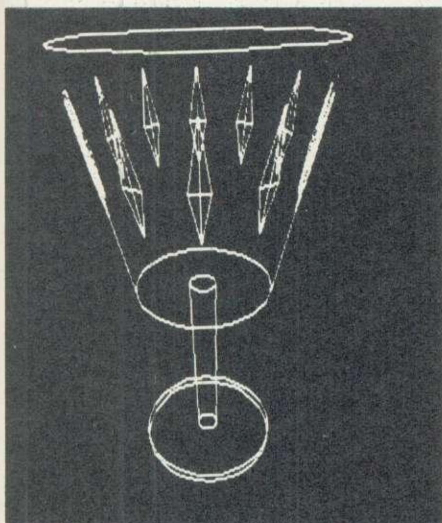


**Figure 5. The wireframe wineglass**

ities of the wineglass. The wineglass (figure 5) is generated by three calls to PROC generateandplotcyl which construct and plot the top section, stem and base. The first two parameters are the top and bottom radii. These are equal for the base and the stem (which are perfect cylinders) and different for the top section (part of a cone).

The cylinders are constructed by making circles in the (x,y) plane. These are then turned into ellipses by the viewpoint transformation (discussed in detail in the book).

PROCfindedges locates the edges that have to be drawn from the top circle (ellipse) to the bottom circle (ellipse) for each cylinder. Depending on the viewing angle, even for a perfect cylinder (equal top and bottom radii) changing the viewpoint will in general turn these into unequal ellipses.

Finally, the 'diamond' motifs are generated on the surface of the top section, so that each motif must be, as it were, painted onto the curved surface of the top section. This is done by ignoring the circumferential curvature of the surface (which is part of the surface of a cone) and only taking into account the 'slope' of the surface. This is like sticking flat rigid motifs on the surface of the glass – only the vertical line down the centre of the motif would stick to the glass. You can see, however, that the final effect is quite convincing.

## Decorative techniques

The book discusses in greater detail 3D transformations and their use in manipulating and decorating models, but here's a short consideration of three-dimensional decoration. Similar techniques to those presented could be used to make the motifs on the wineglass the correct (curved) shape.

To decorate surfaces with digitised motifs, a two-dimensional motif or decoration is first defined in the x,y plane. Decorating a three-dimensional object with a two-dimensional motif is equivalent to taking a piece of paper on which the motif is drawn and glueing it onto the surface of the object. If the surface onto which we are glueing the motif is flat then the required transformation is linear. If the surface is curved, it is non-linear.

Listing 5 uses a non-linear transformation to wrap outline characters defined in two dimensions around a cylinder. Figure 6 shows this idea, whereas the illustration on page 82 shows a colour version of a butterfly wrapped around the cylinder. Note that it is the points or vertices of each figure that are transformed and not the lines connecting them. Although we place the points on the surface of a cylinder, the lines between the points do not follow this surface and therefore the transformation procedure will not 'work' for figures with large distances between the points.

The next example deals with sticking a motif on a spherical surface. The procedure that implements this transformation is given in listing 6 and this can be used to generate the output shown in figure 7. This transformation is in fact the reverse of the Mercator projection which is used to transform shapes on the surface of the earth and display them in a two-dimensional atlas.

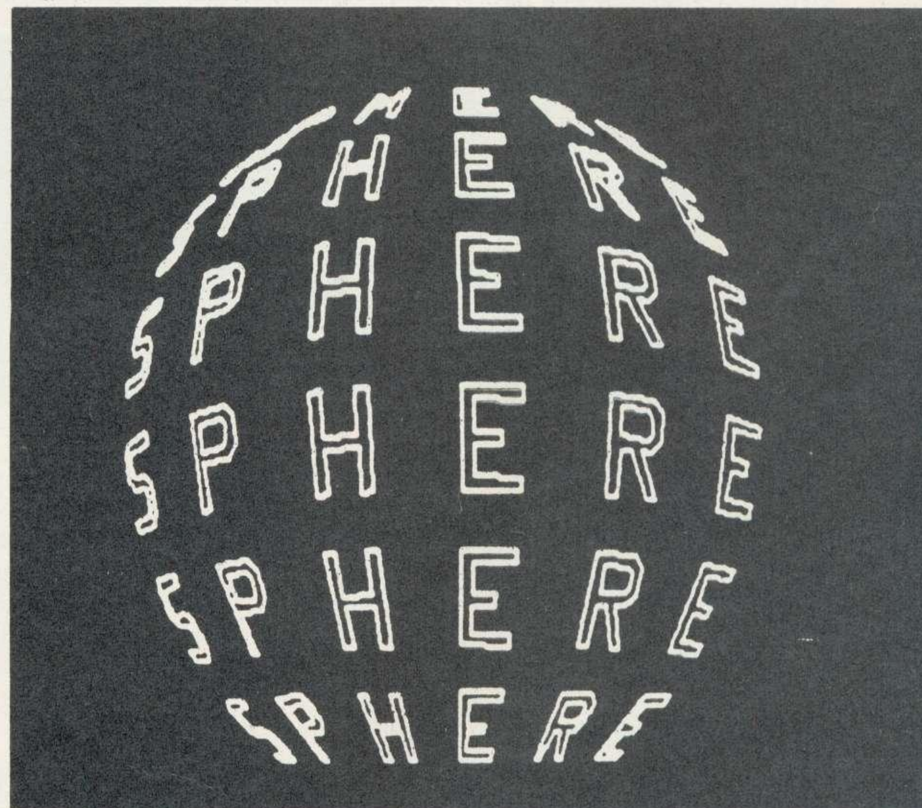



**Figure 7. Mapping onto a spherical surface. The procedure that implements this is given in listing 6**

Our final example, on page 82, shows a stereo image of a three-dimensional object. Although the best stereo effect is obtained on the screen by using red and blue, for the sake of clarity in the illustration red and green have been used.

To produce a stereo effect, the image produced on the screen should consist of two views of the object seen from two slightly different viewpoints. One view is displayed in red and the other in blue. The idea is that the red image represents what should be seen by the left eye and the blue image what should be seen by the right.

To see the stereo effect, the screen can be viewed through a pair of cheap stereo red-blue filter glasses.

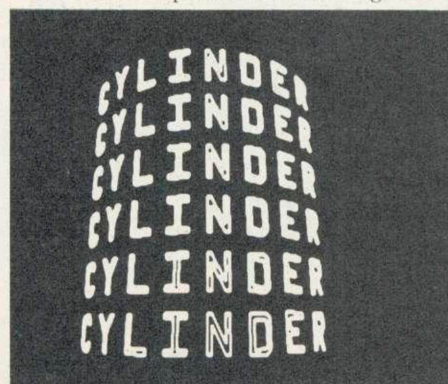


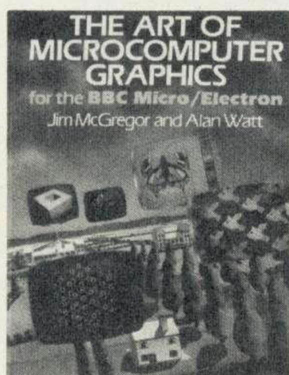

**Figure 6. Mapping on to a cylindrical surface**

*This is the final article in a series of four adapted by Stephen Maddock from* The Art of Microcomputer Graphics for the BBC Micro/Electron. *The book, by Jim McGregor and Alan Watt is published by Addison-Wesley Publishers Ltd. See page 87 for details of how to send for the book and associated software,* Graphito *and* Tesselator.

*Turn to yellow pages 113 to 117 for Jim McGregor and Alan Watt's listings*

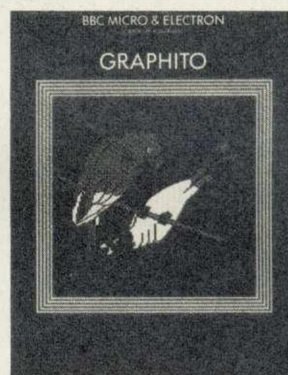
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# BRUSHING UP YOUR PAINTING

**Draw a rosy picture with this superb painting package combining popular colour-filling and painting programs previously presented in Acorn User**

*Jonathan Baldwin*

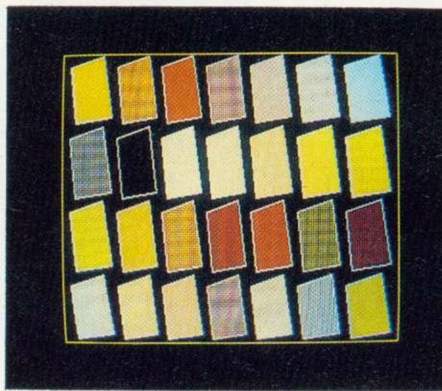
The thought of constructing an entire program from scratch is quite a daunting one to many readers. Even if you have enough time to spare, you may not get very far with it because you don't really know where to start. On the other hand, just using the computer as a glorified typewriter, doing nothing more than copying and running the listings of others, is a bit mind-numbing (well – after a while it becomes so, anyway).

The problem of getting started can be partly solved because ideas are often sparked-off by existing programs. If you find yourself wondering 'what if?' having run a particular program, then why not jot down some notes on what you would like it to do? From there you may find that it is just a matter of identifying the relevant variables and changing their values. Alternatively it could be that you will need to write out a new procedure, starting with a top level design. Don't worry too much if it produces some unexpected results first time round; after all, that is half the fun of the game!

My modification of Rob Fenton's painting program is an example of what I mean (see the yellow pages). The original program appeared in the February 1985 issue of *Acorn User* as a mode 2 painting utility. The main program loop called various procedures which ran almost independently, so altering one of them was unlikely to have a 'knock-on' effect elsewhere. The listing was well structured with clearly labelled procedures, making it easy to identify just where alterations should be made.

When run, the original program displayed the usual graphics cursor (a small cross), with the useful addition of four surrounding dots to mark out the area which would be affected by various functions, eg, shape-drawing and copying. It also had an attractive menu of colours across the top of the screen and a two-way fill routine which could place single lines of alternate colours between two non-background colours. The results I obtained using this program certainly looked very pleasing and I began tinkering with the listing simply because I wanted to try it out in mode 1, as mode 2 is rather coarse and lumpy. This certainly smartened up any outlines but made a mess of the menu and fill routines.

ILLUSTRATION BY PETER WILSON



**Some of the colour fills available**

| | |
|---|---|
| **Cst%(1)** | holds cursor co-ordinates of copy |
| **ast%** | holds width and height of copy |
| **Colfill** | &1200, address of COLFILL |
| **rot** | current angle of ellipse |
| **cx** | preset shape width |
| **cy** | preset shape height |
| **ox** | old circle/cross X co-ordinate |
| **oy** | old circle/cross Y co-ordinate |
| **ex** | previous ellipse/new circle X co-ordinate |
| **ey** | previous ellipse/new circle Y co-ordinate |
| **ocx** | old cross width before rotation |
| **ocy** | old cross height before rotation |
| **erot** | old cross rotation |
| **orot** | old ellipse rotation |
| **st** | art start |
| **any** | control for arc drawing loop |
| **fin** | arc end |
| **start** | local ellipse start |
| **stop** | local ellipse end |
| **x** | ellipse perimeter X co-ordinate |
| **y** | ellipse perimeter Y co-ordinate |
| **sirot** | sin of rotation angle |
| **corot** | cos of arc drawing |
| **mes $** | status message |
| **de** | variable for delay length |

**List of the variables that you will find in the *Painter* program on the yellow pages**

The menu was actually quite simple to fix but how to alter the fill was less obvious. In mode 1 it could only use four colours, but it occurred to me that Peter Sandford's excellent colour-fill routine (*Acorn User*, January '85) would be well worth trying since it is specifically designed to mix mode 1 colours to give 28 possible shades. The routine is easily called from a Basic program using the X,Y cursor co-ordinates and the index number of the required fill pattern as its parameters.

In order to try this out, initially I inserted a call to the routine in place of the fill procedure, and the pattern number was entered with an input statement instead of the menu. This may sound crude, but at least it proved that the idea would work. I then set about making a decent presentation of it. Menus are a useful means of making choices so I constructed one consisting of two rows of outline boxes to take samples of the fills.

Having combined *Colfill* and *Paintbox* to such good effect it seemed worth refining the result further still. There were a lot of small odds and ends to do with key choice and response, which are really a matter of personal preference, and I incorporated those which suited me but I'm sure that you will have your own ideas.

The original cursor was rather tiring to look at because it had a pronounced flicker due to the key-press routine being sampled at every pass of the main loop. Inserting an instruction to ignore it until a key-press occurred made a big difference.

Most of the other changes were prompted by the conversion to mode 1: the circle

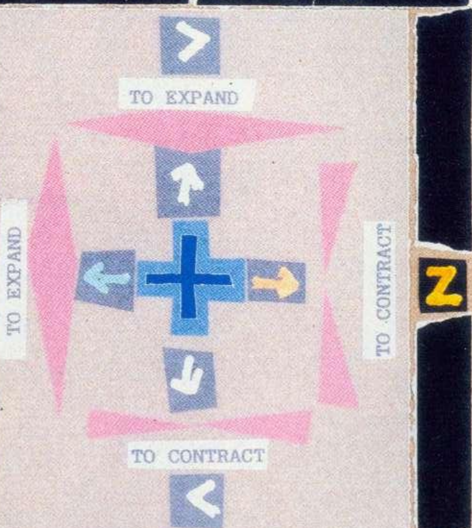
## Running the programs

On chaining *Painter* the screen clears to a menu of fill patterns across the top and a white line at its base below which messages are printed. The following functions are selectable from the main program:

| | |
|---|---|
| **Cursor keys** | Move cursor |
| **−,+,*,[,]** | Change cursor speed |
| **f0** | Draw square or rectangle |
| **f1** | Draw circle |
| **f2** | Printer dump |
| **Shift + f6** | Clear screen |
| **f7** | Select continuous outline |
| **f8** | Solid infill |
| **f9** | Dotted outline |
| **f4** | Airbrush |
| **f5** | Select fill-begin, Shift ends |
| **f6** | Enter arc drawing |
| **f3** | Begin filling (C begins colour change; 1,2,3,0 cycle colours; Escape exits) |
| **Shift + f0** | Loads workfile 'wf' |
| **Shift + f4** | Saves workfile called 'wf' |
| **O** | Cursor/rubber-band toggle |
| **S** | Moves to rubber-band line start |
| **F** | Fixes rubber-band line |
| **I** | Inverts colour |
| **D** | Places dot |
| **A,Z,<,>** | Changes size of area for shape drawing and copies |
| **V** | Vertical rule toggle |
| **H** | Horizontal rule toggle |
| **Tab** | Black line to right of cursor |
| **Copy** | Mark area for copying |
| **M** | Horizontal mirror |
| **V** | Vertical mirror |
| **Delete** | Executes copying |
| **Shift + S** | Saves named screen |
| **Shift + L** | Loads named screen |

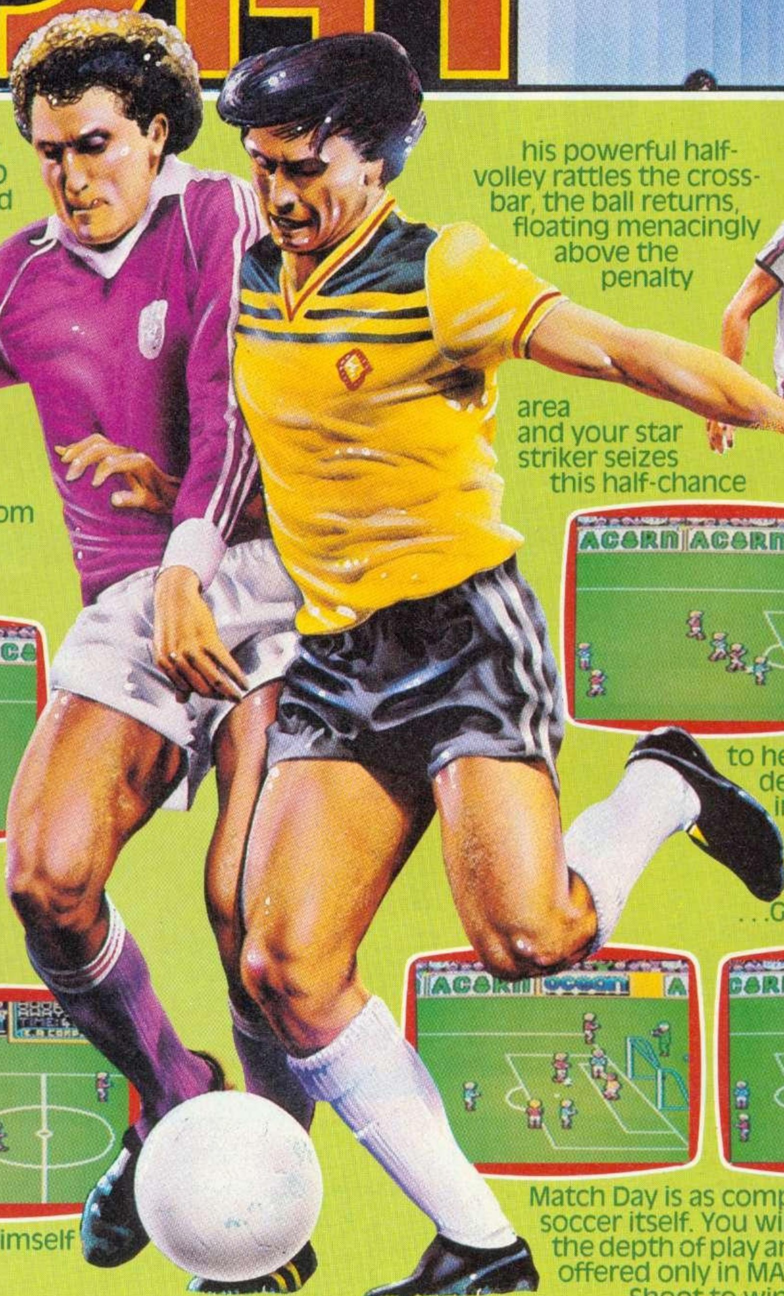
**Cursor keys, CTRL, Caps Lock, A,Z,<,>**, change ellipse dimensions, rotation and position – **Space** transfers a sample ellipse, **Return** draws ellipse and exits, **Shift** enters arc drawing
**Space** chooses start point – **Return** fixes
**Space** chooses end point – **Return** draws arc and exits

**Return** returns from error to main program, **Escape** exits
During filling **Escape** exits to the main program









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drawing procedure, for example, used trigonometric ratios which produced acceptable curves in mode 2 but not in mode 1. I have also included a procedure to draw elliptical arcs at any angle as the original routine, though fast and easy to use, is a bit restricted, and I've added a colour-changing routine, as mode 1 only supports four physical colours on screen.

*Paintbox* also supported a copy routine which was effective but only copied everything from one screen to another. Adding a couple of variables to reverse the procedure's control loops made mirroring possible, a useful facility for drawing reflections or symmetric shapes. The background colour has been suppressed in copies to avoid cut-off edges.

As a final touch, the base of the screen now displays a status line which messages can be written to without disrupting the current screen image.

## Using the program

On running the program you are presented with the menu of colour-fill patterns at the top of the screen, a white line at the base below which the status messages are printed, and a cursor in the form of a cross surrounded by four dots. This is moved using the cursor keys and its speed is set by the following keys: '−' for slow, '+' for medium. '*' for fast, '[' to slow down, ']' to speed up.

Pressing 'f0' draws a rectangle between the dots, 'f1' gives an ellipse – to change their proportions, hit 'A' to expand vertically, 'Z' to contract, while '>' and '<' respectively expand and contract horizontally.

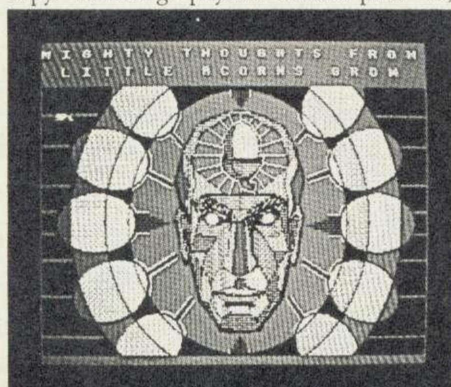
Irregular shapes are drawn by rubber banding – pressing 'O' repeatedly will toggle between the cursor and the rubber band. In this mode the cursor keys move the free end of a moveable line: hit 'F' to fix it or 'S' to start a new line from the free end.

To fill an enclosed shape press 'f5', which makes the cursor jump into the menu where it can be moved over your chosen fill using the keys already described. Pressing Shift completes the choice and the cursor will reappear in the picture area. With the cursor in an enclosed shape press 'f3' to begin filling.

There are four solid fills in the menu and choosing one of these will also select it as the current drawing colour.

If a fill leaks out of a shape, press Escape as quickly as possible to end it. Disc users can correct these leaks, and other problems, by previously storing the screen as a work file with Shift 'f4'. To retrieve it just press Shift 'f0' and any disasters magically disappear. Erasing can also be done by pressing 'I' to invert the colour (usually white to black), and then drawing as normal. Large blocks can be removed using circles and squares with 'f8' to select solid infill ('f9' selects dotted outlines and 'f7' reselects continuous outline). 'D' places a dot which is useful for taking out odd pixels, and pressing 'I' again restores the current drawing colour (normally dots would be used for highlights, etc). 'Tab' draws a black line to the right of the cursor up to the next background colour but needs to be used with care as its results are not easy to predict. Shift 'f6' clears the screen.

'V' toggles the vertical ruler, 'H' does the same for the horizontal. 'Copy' selects the area between the cursor's dots for copying, then 'M' and 'N' will choose left/right, up/down mirroring or both, and hit Delete to make the copy. To change physical colours press 'C', then use '0', '1', '2', '3' repeatedly to cycle through the physical colours for each logical colour, and then finally press Return to make the choice.



**Creativity goes to your head with Super Painter**

Arc-drawing is selected with 'f6'; a simple ellipse and a cross formed by its axes are shown on entry. Cursor keys move the cross and you can rotate it clockwise with 'CTRL' and anticlockwise with 'Caps Lock'. It can be magnified using '>' and reduced by '<' (to keep its proportions if using perspective). 'A' increases one axis and 'Z' reduces it for a different shape. 'Space' will remove the sample ellipse and redraw it at the cross – Return fixes it and leaves the procedure. Shift selects arc-drawing; it puts a cursor on the ellipse and Space moves it to where you want the arc to start. Press Return when it has been positioned and repeat the process to end the arc. You can rotate the crosses several times but the end must be further clockwise than the start, including any complete rotations. If all is well you should be left with an arc; pressing 'f6' will provide the temporary ellipse again, as it was when the arc was drawn – useful for identical objects such as car wheels.

The program just fits into memory with PAGE set at &1900 but you can grab space for more routines as follows. Tape users should set PAGE to &1200. Disc users can set it to &1500, and can speed up initialisation by loading the program and adding these lines:

```
145 *SAVE MENU 3000 +C80
146 END
```

Run the program, remove lines 145 and 146 and add:

```
140 *LOAD MENU
```

In the spirit of this article, the program has been left with lots of scope for your own improvements and modifications. For example, you can convert it for joysticks by adding the following lines:

```
215 PROCcm
2020 X %=&500-(ADVAL(1)/&33)
2030 Y%=ADVAL(2)/&33
```

and deleting lines 2040, 2050 and references to PROCspeed which will be irrelevant. Alternatively, if space allows you could define a key to toggle joysticks with the keyboard. Messages have only been used sparingly and you can produce your own with:

PROCms(W%, "Your message goes here")

where W% is a flag which, if set, makes the program wait for a key-press. PROCbase blanks out the message. Other possibilities include rotating copies, inputting text at the cursor, or using predefined shapes other than circles and rectangles, such as the triangles suggested by Mary Clayton (*Acorn User*, letters page June 1985).

I hope all this has given you food for thought and that you will be spending many enjoyable hours browsing through the listings with a certain gleam in your eye!

| | |
|---|---|
| **A%** | Old X co-ordinate of cursor |
| **B%** | Old Y co-ordinate of cursor |
| **C%** | Index of logical colour |
| **D%** | Cursor speed |
| **E%** | Physical colour index |
| **F%** | Flag for arc choice |
| **G%** | Flag for ellipse choice |
| **H%** | Horizontal ruler flag |
| **J%** | Control loop index |
| **K%** | Plot type |
| **L%** | Rubber band flag |
| **M%** | Stored copy X co-ordinate |
| **N%** | Stored copy Y co-ordinate |
| **Q%** | Loop index |
| **R%** | Mirror up/down copy |
| **S%** | Mirror left/right copy |
| **T%** | Fill index |
| **U%** | Physical colour choice |
| **V%** | Vertical ruler |
| **W%** | Value of GET |
| **X%** | Cursor X co-ordinate |
| **Y%** | Cursor Y co-ordinate |
| **Z%** | Escape flag |

**List of the resident integers**

*The listing for Jonathan Baldwin's* Painter *program is on yellow pages 118 to 120*

# COMPETITION

## WIN THREE CLASSY MONITORS

**Wrap your brains and micros round this month's questions**

***Simon Dally***




In the following questions, the word 'number' means positive integer in base 10 arithmetic. Get the answers right and you could win one of three Taxan Vision 2 medium resolution RGB colour monitors worth over £325 each – see the review on page 174 of the November 1985 issue.

**(1)** You can form chains of numbers by starting with any two numbers, adding them together to produce a third number, then adding the second and third to produce a fourth, etc. Thus 2 9 11 20 31 . . . .

Your object is to produce the number 1,000,000 with the longest possible chain. What two numbers do you start with?

**(2)** What is the largest number you can form by multiplying two five-digit numbers which between them use all 10 digits once only?

**(3)** If the word INVENTORY represents a number, with different letters standing for different digits, what does its cube root spell?

**(4)**

```
   XXXXXX
       XX
  -------
   XXXXXX
  XXXXXX
  -------
  OCTOBER
```

To help you solve this multiplication sum, the following are all prime numbers:

OCTO
CTO
CTOB
TO
TOBE
TOBER
OBER
BER
BE
ER
R

What number is OCTOBER?

Answers on a postcard or back of an envelope please, including the coupon below, to January Competition, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH to arrive not later than January 18.

### SEPTEMBER WINNERS

September's competition produced around 200 entries. The answers to the questions were, respectively, 13, 69 and 30, and in the various manifestations of Mad Alex the genuine article was A, A and B. The final solution was 349,869.

The ten lucky winners of the *Sleuth* Roms are S Kibble, Norfolk; N Mitchell, Co Down; C Collins, Milton Keynes; A J Monk, Dorset; I B Bell, Cambridge; C H H Van Beurden, Holland; M Farrell, Nottingham; P Ryder, Manchester; J G Rees, W Glamorgan; I de Bengoechera, Canary Isles.

**ACORN USER**
**COMPETITION**
**JANUARY**

# Synergy Software

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STOP TIMING – Check your rating:
40 seconds = slow, 35 seconds = average, 20 seconds = fast, 15 seconds = very fast.
Whichever rating you achieved we would expect the average user to read at least 50% faster by the end of the course. A LIFETIME INVESTMENT AT £27.95. WRITE FOR DETAILS.

## EASIPLOT

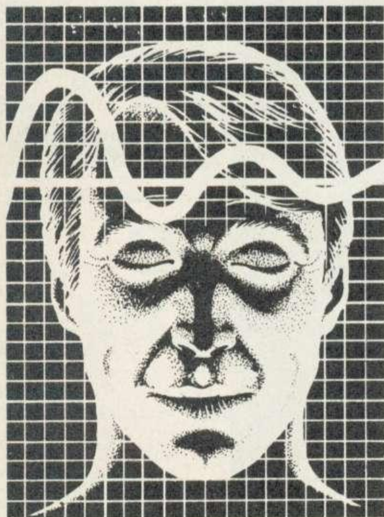
**"a very good program" A + B Computing**
**"excellent" Which? Software Guide**

Easiplot is a sophisticated and user friendly BUSINESS and EDUCATIONAL graph package. Voted the 14th best educational program, Easiplot has come to be regarded as an outstanding business package and excellent value for money.

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★5 line or bar merging
★Bar/Line conversion option
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★Screendump for Epson compatible printers
★Save/Load options on single or dual drives
★Provides easy access to screendump ROM's
★Grid and screensave facilities
★56 page USER MANUAL

## BIOGRAM

**'This original and imaginative package is excellent value for money. . .it provides the user with a very cheap near equivalent of a dedicated professional system costing many times its purchase price.' A&B Computing (JUNE 85). "GOOD VALUE FOR MONEY" MICRO USER (NOV' 85)**



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BIOGRAM uses proven biofeedback techniques to provide you with audio/visual impressions of your physiological and psychological state.

Your stress level is detected by two electrodes and is converted and relayed to the computer by the electronic BIO-MODULE. The BIOGRAM software translates this signal into a form that will enable the user to learn to influence his own state of mind.

BIOGRAM is FUN and EASY to use, just plug in the module, attach the electrodes and choose your program. Ready to run in seconds.

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The BIOGRAM software package includes:
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★LIE DETECTOR – a graphical lie detector with an automatic interrogation facility.
★P.REDUCER – a programmable phobia identifier and reducer.
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HARNESS THE POWER OF BIOFEEDBACK – LEARN TO CONTROL YOUR FEARS, PHOBIAS and STATE of TENSION. AN INVESTMENT FOR THE WHOLE FAMILY.

## SHARE ANALYSER

**'an excellent program' *Micro User* – Jan 85**
**'an invaluable aid' *Northern Echo***
**'very highly recommended' *Which? Software Guide***
**'Excellent investment' *Luton News***

Share Analyser is a comprehensive reporting, analysis and charting package for the BBC Micro. Transaction and share price databases are built up for each share name and a variety of report and analysis facilities can be instantly accessed. Reports can be produced on any printer. Share Analyser is easy to use and is supplied with a comprehensive Operating Manual.

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★Use as many disks as you require
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★Reports include Valuation, Profit Statements, Movement Analysis, Transaction Reports etc
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| Rapid Reader (disk only). . *BBC B & B+* | £27.95 |
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# ELITISM

**Fed up with your failure at Elite? Want to win by fair means or foul? Then these insights into this best-selling game could set you on the road to success**

***Paul Skirrow and Paul Springate***

This article on *Elite*, and the follow-up next month, give you some insight into how this remarkable game works, and a few pointers for people still struggling with it. We'll refer to the BBC micro disc version – a few things may be different in the cassette or Electron variations (but feel free to try our programs with them). Some of the bugs may have been fixed in later versions of *Elite*, but everything else will be the same.

Next month we'll present a program that allows you to create *Elite* commanders from scratch (and alter existing ones). Not only does this let beginners become *Elite* and practise using military lasers, etc, it also allows super commanders to be created with attributes that even Acornsoft couldn't have dreamt of! For example, it's possible to reach galaxy nine and create your own galaxies (including ones with no stars!).

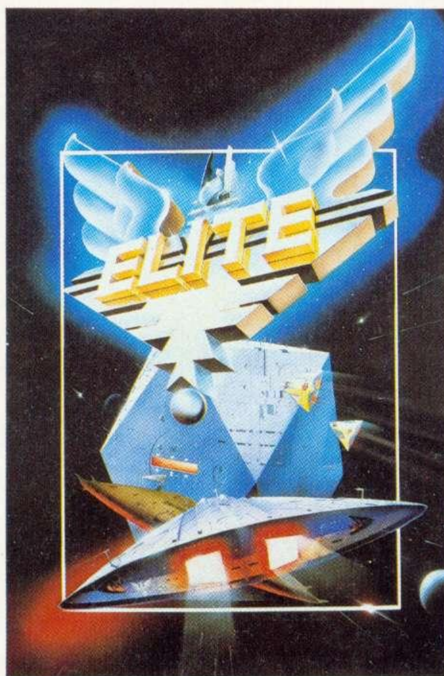
We have also succeeded in printing screen images on an Epson printer. This involves three stages. First, leave a program running in the Beeb when you run *Elite* that saves the screen to disc. The next step is to convert the *Elite* screen format to a mode 1 or a mode 4 screen, and finally output this on the printer (using *Printmaster*, *Dumpout* or one of the many screen dump programs available). We especially like the 1in square pictures which look very impressive but take ages to print using our Basic program.

Unfortunately the first stage is harder than it sounds, and we haven't yet managed to do it without changing *Elite* itself.

### Beginners start here

A lot of people seem to experience problems docking (maybe because they are using the docking computer?), so here are some guidelines to help you.

You must fly into the space station from the planet side, along the axis joining the space station and the centre of the planet. The best way to do this is to fly to a point in between them and then stop and turn to face the station. Fly in fairly slowly (but definitely *not* at minimum speed as this is difficult), rotating




**Elite: a remarkable and popular game**

with the space station (it may help if you turn off 'rotation dampers' and 'auto centralisers' using Copy, Caps Lock, A, Delete). You may find it easier to fly in at full speed – it's not as hard as it sounds, it just takes a lot of nerve!

As you improve you'll find that you can fly to a point nearer to the station and you won't need to slow down. Buying a docking computer may help, but if you have enough money for one of these you are probably better at docking than it is! It usually works providing you turn it on early and don't approach the station from the back, but it has been known to kill occasionally.

Note that you don't need to have a Bitstik to be able to use Bitstik mode (selected by typing Copy B Delete), as you can use ordinary joysticks. One joystick works as normal (except that it is upside down), while the horizontal movement of the other controls your speed. This allows you to change your pace quickly and to go slower than is possible using the keyboard. (The stars don't move out of the side views.)

You can dock if you are a fugitive provided you didn't become one in that system (ie, shooting the space station and its police ships, then attempting to dock won't work).

### Cheating

Yes, even this game has some bugs. For the lucky few who have an old version of *Elite* the most useful bug is the 'laser bug' – we expect most of you know about this already. If you try to fit a beam laser where you have got one fitted already, your money increases significantly for no apparent reason! Don't try a military laser because that loses you money.

The Watford *ROM Manager* makes you Elite immediately (by giving you &8000 points – see later), and also gives you the first mission as soon as you dock, as this is based on your current score.

Buying over 100 units of platinum, gold, etc, loses you the hundreds figure. Not very useful, this one!

### D. information files

After playing *Elite* for several weeks, we soon became Elite and realised that we weren't going to get a third mission, or see a dredger or generation ship, or even an asteroid (sigh). The next step (in the true spirit of adventurers everywhere) was naturally to examine the disc to look for more. We didn't find any signs of dredgers, or generation ships but did find asteroids in the D.MOP file, among others.

The D. MOA to D. MOP files on the *Elite* disc contain information for all the ships that appear in the game and one of these files is loaded in when you leave the space station or go through hyperspace. Each file holds information for 10 to 12 different objects. Every file has details for one of the space stations (a Dodo or a Coriolis), Vipers, Cobras, escape pods, cargo cannisters and alloys, so that all of these can appear at any stage in the game without reloading a D. file (ie, D. MOA to D. MOP).

A space station is obviously needed in any planetary system, as are Vipers (they always appear if you shoot a space station or become a fugitive). The Cobra is required in case you use the escape pod (so that you can see your Cobra float away from your escape pod). Escape pods can appear at any point, as they are often used

by Viper commanders if you worry them. Similarly cargo cannisters and alloys are needed in case you destroy a ship carrying them.

However, a number of ships only appear in one of the D. files. These are Anacondas, Fer-de-Lances, orbit shuttles, Moray starboats, Transporters, and Worm class landing craft. This explains why these ships are rarely seen (ie, when that D. file is loaded). The particular D. file chosen depends on the circumstances. For example, on the second mission a file with Thargoids in it is always chosen, or at the end of the first mission the file with the Constrictor in it is loaded. If you are leaving a Dodo space station, the D. file used will be one containing a Dodo space station.

The D. files contain information about the shapes of each of the objects (ships, cargo cannisters, etc), as well as its speed, manoeuvrability, armaments, cargo capacity, hull stress factor/shields, explosion shape, and information about the cargo it carries. It does *not* contain information about the nature of the ship (ie, whether it could be a pirate or police, and so on).

Presumably Acornsoft could have used a different file for each object and *Elite* could then have selected and loaded 10 or 12 of these files, but that would probably have slowed the game down somewhat and complicated the programming.

### Commander files

The most interesting files are the E. files that contain information about commanders. These are much simpler to interpret than the D. files and far more interesting. Every commander file is 256 bytes long but only the first 76 bytes are used in the current version of the game (is the rest for future expansion?).

The commander file contains every bit of information about your commander (the legal status, money, equipment, cargo, fuel, etc) as well as information about the current space station (quantities and so on). It also contains a mission control variable to indicate which missions have been completed and what stage in the mission you have reached.

Your score is also stored in the commander file. You earn one point for each object destroyed (including missiles and cargo cannisters), and some for sun-skimming. Every time you score 256 you get a 'right on commander!' message, and you become Elite when you score 6144 (&1800 in hexadecimal). To find your score, for example if your commander is called Kiki, type:

*DUMP E.KIKI

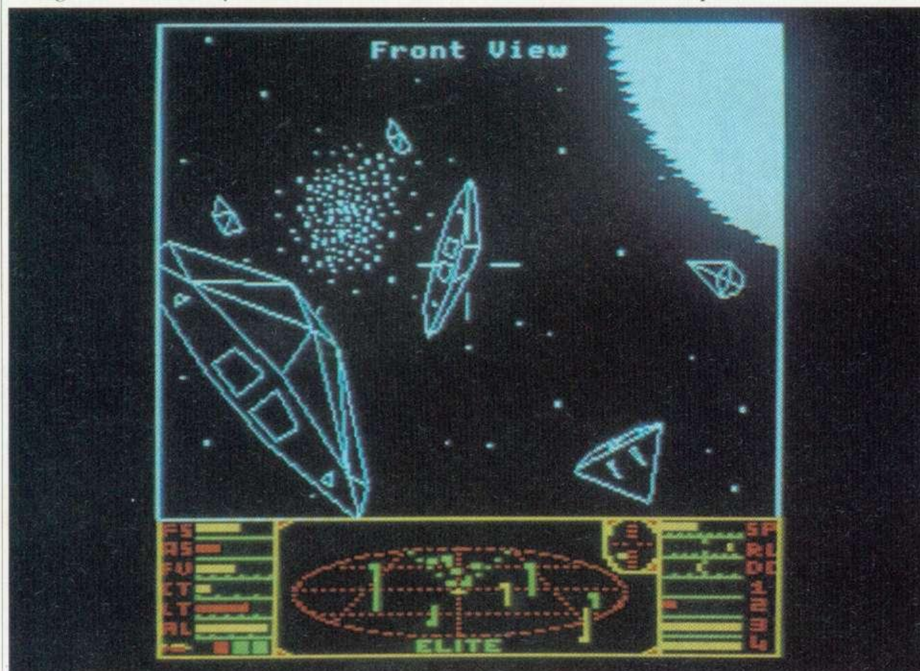
and look at bytes &47 and &48. The score is 256 times the contents of &48 plus the contents of &47 (see an example dump on the yellow pages).

The maximum amount of fuel is 25.5 light-years-worth, and the maximum number of credits is 429,496,729.5 – above this you'll return to 0.

Before you reach for your BBC micros and try to create a super commander of your own, we must warn you that Acornsoft did think of this possibility and it put in a sneaky bit of code to prevent indiscriminate tampering with the save file. Every commander file has a two byte key which is calculated from the data in the file. Changing the data means the key must be recalculated. We spent several days trying to work out this key by looking at lots of save files – however, after several gallons of coffee and sleepless nights we gave up and disassembled *Elite* instead (which turned out to be much easier). After wading through reams of paper we eventually found the encoding technique. Writing a Basic program to perform the same encoding function was trivial and we followed this by producing a full screen editor that allows saved commanders to be edited as you like.

A full listing of this program and a complete explanation of the Commander file will be given in the next article. But to whet your appetite, a simple program to create a special commander is given in the yellow pages.

Type the program in, then save and run it. It creates an *Elite* commander, called Slog (ie, the file is E.SLOG). You can *DUMP E.SLOG and check it against the example *DUMP on the yellow pages, and it should be the same. Run *Elite* and load Commander SLOG. It gives you 16 missiles, 25.5 light years fuel, extra powerful 'pulse' lasers on the rear and sides, super-quick energy unit and puts you in galaxy nine. However, you have no money, no front laser and only two tons of cargo space! You also get lots of Thargoids (you can missile them if you fire at the last possible moment – even out of the front, but remember you have no front sights).



**'The most interesting files are the E. files that contain information about commanders'**

### Elite 2

*Elite 2* was used for the national finals of the *Elite* competition in May. It runs on the 6502 second processor, and uses modes 1 and 2. The main display is in four colours – the sun is yellow, lasers red, etc. The console uses a mode 2-type display to show various ships in different colours, and so on. Normal *Elite* uses modes 4 and 5 (ie, two and four colours respectively).

The split screen mode technique is similar to that described in the May 1985 *Acorn User*, but is only 32 characters wide.

*Elite 2* doesn't access disc when playing (except for loading and saving commanders), as it can load all the necessary files in one go into the second processor's memory. It is faster than *Elite* and does not slow down nearly as much when explosions and planets are visible on the screen.

Unfortunately, according to the people at Acorn, at the moment *Elite 2* doesn't seem to have any extra missions or ships, but these may be added before this version is released (although when this will be is anyone's guess).

Elite *is published by Acornsoft at £14.95 (cassette) and £17.95 disc. It was reviewed in* Acorn User *October 1984, page 165.*

*Turn to yellow page 107 for Paul Skirrow and Paul Springate's examples*

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Name ....................................................

Address ....................................................

Dealer name ....................................................

Serial number of printer purchased....................................................

8. My original reason for buying a Taxan printer for an Acorn in 15 words is ....................................................

....................................................

.................................................... HA10

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|---|---|
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*INPUT - is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the utilities disc were written using this procedure
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Mike Bibby Editor of MICRO USER
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Future modules will be STATEMENT and ACCOUNTS RECEIVABLE, STOCK CONTROL, ACCOUNTS PAYABLE and NOMINAL LEDGER.
All relative files are compatible with CLARES Beta-Base which can be used to manipulate the files as required. The Beta-Base Utilities Disc provides Mail-Merge facilities using the customer list.
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The pack includes:

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- explanatory booklet written by *Acorn User* author George Hill
- software to print bar codes
- music program by Joe Telford
- bar code stencil
- disc or cassette of utility software

*Note to disc users:* the disc supplied is 40 track – however, if you order the cassette, there are instructions on how to transfer the software to 40 or 80 track discs. All for £60.84 inc VAT and £2.95 postage (£52.90 exc VAT). Stock remaining at this MEP subsidised price is limited†.

### Bar code booklets

All the major listings for this issue, as printed on the yellow pages, are reproduced in bar code format in our booklet. Send a cheque or postal order for £1.60 plus an A4-sized sae to Bar Code Listings at the address below.

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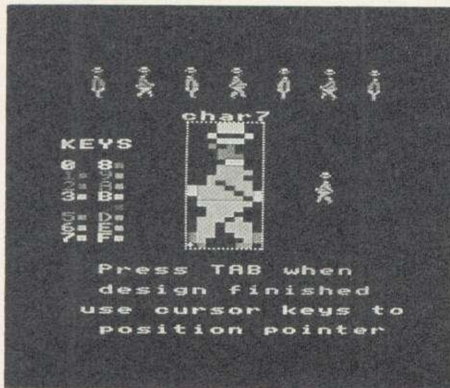
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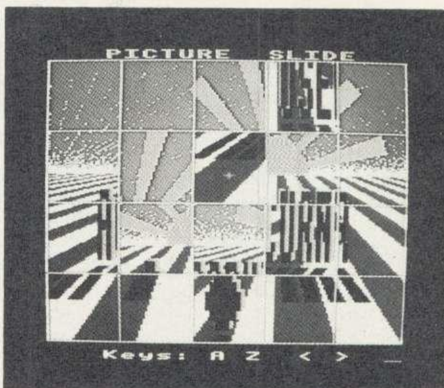
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| ***TDUMP** | dumps the text window in any mode |
| ***JDUMP** | colour dump for the JX80 printer |
| ***WINDOW** | defines a graphics window from the keyboard |
| ***C@** | sets up CTRL @ option |
| ***TRANSTT** | converts a teletext screen into mode 1 |
| ***RTT** | restores a teletext screen after *TRANSTT |
| ***LPRINT** | directs all PRINT commands to the printer only |
| ***LPOFF** | cancels*LPRINT |
| ***SET** | sets the printer text style |
| ***RESET** | turns off the effect of *SET |
| ***MAR** | sets either printer margin |
| ***SHIFT** | shifts an area of memory |
| ***CP80** | selects a CP80-type printer |
| ***IBM** | selects an IBM-style printer |
| ***EPSON** | cancels *CP80 or *IBM and selects Epson-style printer |

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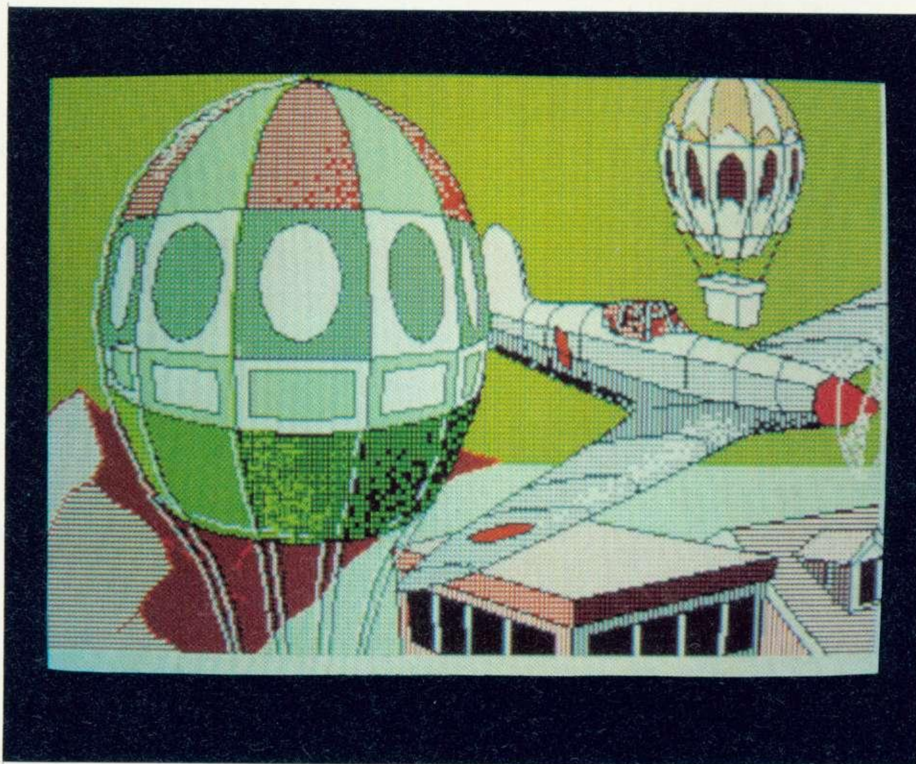
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HA3

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# YELLOW PAGES

## HINTS & TIPS

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| | Listing 2 | 105 | ● | ● | ● | ● | ● | ● |
| Spectramania | Listing 1 | 107 | ● | ● | ● | | ● | ●(a) |
| | Listing 2 | 108 | ● | ● | ● | | ● | ●(a) |
| | Listing 3 | 111 | ● | ● | ● | | ● | ●(a) |
| Elite Commander Generator | Listing 1 | 107 | ● | ● | ● | | | ● |
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| Super Painter | Listing 1 | 117 | ● | ● | ● | | ● | ●(a) |

Note: (a) Switch shadow screen RAM off if you have a B+.

Hints & Tips,see page 48

**Listing 1. Prints out the ASCII codes on your printer for checking against those of the Epson EX80**

```
10 REM Hints & Tips - listing 1
20 REM by Martin Phillips
30 REM BBC B/B+/128k and Electron
40 REM (c) Acorn User January 1986
50 VDU 2
60 @%=5
70 FOR N%=0 TO 255
80 A$=" "+CHR$(N%)+"    "
90 IF (N% MOD 128)<32 THEN A$=" ctrl"
100 IF (N% MOD 128)=127 THEN A$=" del "
110 PRINT N%;A$;
120 NEXT N%
130 PRINT CHR$(12)
140 VDU3
```

**Listing 2. Works out what day of the week a date will fall on**

```
10 REM Hints & Tips - listing 2
20 REM by Martin Phillips
30 REM BBC B/B+/128k and Electron
40 REM (c) Acorn User January 1986
50 :
60 MODE 1
70 PROCinitialise
80 REPEAT
90 PROCmenu
100 UNTIL bored
110 MODE7
120 END
130 :
140 DEF PROCinitialise
150 P%=0:bored=0:d%=0:m%=0:y%=0
160 VDU 23;8202;0;0;0;
170 VDU 19,0,7,0,0,0
180 VDU 19,3,4,0,0,0
190 VDU 19,2,5,0,0,0
200 DIM month$(12),mlength(12),day$([illegible])
210 DATA January,31,February,28
220 DATA March,31,April,30,May,31
```

Continued ►

### Enter listings

Where possible, programs are listed with line numbers in increments of 10. With these listings, simply type AUTO <RETURN> before you begin. This will give automatic line numbering. Don't type a space after the line number. To list your program so it appears identical to the printed version in the magazine, type: LISTO 1 <RETURN> WIDTH 40 <RETURN> LIST <RETURN>

With screen models 1,4,6 or 7, WIDTH 40 is not needed. Note that occasionally, for clarity, programs are listed with a text width different to our standard of 40 characters.

Most typing mistakes in Basic will cause error messages when the program is run. Finding errors in assembly language listings is often harder, so we provide checksums where we can. These are small routines which report any mistakes in assembled machine-code. In the August issue of *Acorn User* we published a program for calculating checksums for Basic programs and, when space permits we carry checksum listings for longer Basic programs.

◄ Continued

```
230 DATA June,30,July,31,August,31
240 DATA September,30,October,31
250 DATA November,30,December,31
260 DATA Sunday,Monday,Tuesday
270 DATA Wednesday,Thursday,Friday
280 DATA Saturday
290 FOR I=1 TO 12
300 READ month$(I),mlength(I)
310 NEXT I
320 FOR I=0 TO 6
330 READ day$(I)
340 NEXT I
350 ENDPROC
360 :
370 DEF PROCmenu
380 VDU 26,12
390 PROCdouble("The Date Program",12,1)
400 PRINT TAB(3,5)"1. Find the time betw
een two dates"
410 PRINT TAB(3,9)"2. Print a monthly ca
lendar"
420 PRINT TAB(3,13)"3. Find the day of t
he week"
430 PRINT TAB(3,14)"   for a particular
date"
440 PRINT TAB(3,17)"4. Switch printer ";
:IF P%=0 THEN PRINT "on ":ELSE PRINT"off"
450 PRINT TAB(3,21)"5. End the program"
460 COLOUR 1
470 PRINT TAB(3,25)"Enter a number (1 to
 5)";
480 REPEAT
490 A=GET-48
500 UNTIL A>0 AND A<6
510 COLOUR 3
520 IF A=4 THEN P%=(P%+1) MOD 2:GOTO440
530 VDU 28,0,31,39,3,12
540 IF A=1 THEN PROCtime
550 IF A=2 THEN PROCcalendar
560 IF A=3 THEN PROCday
570 IF A=5 THEN bored =TRUE
580 ENDPROC
590 :
```

Continued ►

◀ **Hints & Tips listing 2 continued**

```
  600 DEF PROCtime
  610 REPEAT
  620 COLOUR 2
  630 PROCdouble("Time calculator",12,1)
  640 COLOUR 3
  650 IF P%=1 THEN VDU2
  660 PROCdate(1)
  670 oldday=day:oldmonth=month
  680 oldyear=year:oldleap=leap
  690 PROCdate(2)
  700 y=year-oldyear:y%=year
  710 m=month-oldmonth:m%=month
  720 d=day-oldday:d%=day
  730 IF d<0 THEN m=m-1:d=d+mlength(oldmon
th):IF oldmonth=2 AND oldleap=1 THEN d=d+1
  740 PRINT'"Difference is ";y" year";:IF
y<>1 THEN PRINT"s"
  750 PRINT TAB(14);m" month";:IF m<>1 THE
N PRINT"s"
  760 PRINT TAB(14);d" day";:IF d<>1 THEN
PRINT"s"
  770 VDU 3
  780 COLOUR 2
  790 PRINT''"      Another entry (Y/N) "
  800 a$=GET$:CLS:COLOUR 3
  810 UNTIL a$<>"Y"
  820 ENDPROC
  830 :
  840 DEF PROCday
  850 COLOUR 2
  860 PROCdouble("Day calculator",13,1)
  870 COLOUR 3
  880 PROCdate(3)
  890 PROCcalc(day,month,year,19)
  900 IF P%=1 THEN VDU2
  910 PRINT''day;" ";month$(month);" 19";y
ear
  920 PRINT'TAB(10);"is a ";day$(I)
  930 VDU 3
  940 PROCspace
  950 ENDPROC
  960 :
  970 DEF PROCcalendar
  980 COLOUR 2
  990 PROCdouble("Calendar",16,1)
 1000 COLOUR 1
 1010 INPUT''"Which month (1-12) "month
 1020 INPUT'"Which year (0-99)  "year
 1030 IF (year MOD 4)=0 THEN mlength(2)=29
 1040 COLOUR 3
 1050 IF P%=1 THEN VDU2,1,10,1,10
 1060 PRINT TAB(15,10);month$(month);" ";"
 19";year'
 1070 PROCcalc(1,month,year,19)
 1080 FOR J=0 TO 6
 1090 PRINT TAB(8);day$(J);
 1100 FOR K=0 TO 5
 1110 D=K*7+J+1-I
 1120 IF D<1 OR D>mlength(month) THEN GOTO
 1150
 1130 IF D<10 THEN x=21 ELSE x=20
 1140 PRINT TAB(K*3+x);D;
 1150 NEXT K
 1160 PRINT
 1170 NEXT J
 1180 VDU 3
 1190 PROCspace
 1200 mlength(2)=28
 1210 ENDPROC
```

**Continued** ▶

◀ **Continued**

```
 1220 :
 1230 DEF PROCcalc(day,month,year,cent)
 1240 month=month-2
 1250 IF month <1 THEN month=month+12:year
=year-1
 1260 I=INT(2.6*month-.19)+day+year+INT(ye
ar/4)+INT(cent/4)-2*cent
 1270 I=I-INT(I/7)*7
 1280 ENDPROC
 1290 :
 1300 DEF PROCdate(F)
 1310 IF F=2 THEN GOTO 1340
 1320 PRINT'"Enter the date in the number
form"
 1330 PRINT"eg 1,1,86"''
 1340 COLOUR 1
 1350 IF F=1 THEN PRINT"Enter starting dat
e";
 1360 IF F=2 AND d%>0 THEN PRINT''"Press R
ETURN for same date or"
 1370 IF F=2 THEN PRINT"   Enter final dat
e";
 1380 IF F=3 THEN PRINT"Enter date";
 1390 INPUT LINEd$
 1400 COLOUR 3
 1410 IF d%>0 AND F=2 AND LENd$=0 THEN d$=
STR$(d%)+","+STR$(m%)+","+STR$(y%):PRINT"
     Final date is "d$:GOTO 1420
 1420 N=INSTR(d$,",")+1
 1430 day=VAL(d$):d$=MID$(d$,N)
 1440 N=INSTR(d$,",")+1
 1450 month=VAL(d$):d$=MID$(d$,N)
 1460 year=VAL(d$)
 1470 leap=0
 1480 IF (year MOD 4)=0 THEN leap=1
 1490 IF mlength(month) >=day AND day >0 T
HEN GOTO 1540
 1500 IF month =2 AND leap =1 AND day=29 T
HEN GOTO 1540
 1510 PRINT'"There is no such day in ";mon
th$(month)'
 1520 SOUND 1,-15,150,10
 1530 GOTO 1340
 1540 ENDPROC
 1550 :
 1560 DEF PROCdouble(A$,x,y)
 1570 X%=0:Y%=13:A%=10:D=&D00
 1580 C$=CHR$(240)+CHR$8+CHR$10+CHR$(241)
 1590 FOR N=1 TO LEN(A$)
 1600 B$=MID$(A$,N,1):?D=ASC(B$):CALL&FFF1
 1610 VDU 23,240,D?1,D?1,D?2,D?2,D?3,D?3,D
?4,D?4
 1620 VDU 23,241,D?5,D?5,D?6,D?6,D?7,D?7,D
?8,D?8
 1630 PRINT TAB(x+N-1,y)C$:NEXT N
 1640 ENDPROC
 1650 :
 1660 DEF PROCspace
 1670 COLOUR 2
 1680 PRINT''"       Press space bar to con
tinue";
 1690 REPEAT:UNTIL GET=32
 1700 COLOUR 3
 1710 ENDPROC
```

*If you think that keying-in all these listings will get you down and your fingers in a tangle, why not save your time and energy by sending for our monthly listings cassette or disc? The cassette tape for the BBC or Electron costs just £3.75; a disc for the BBC is priced at £5.75. See page 103 for more details.*

# YELLOW PAGES

## SPECTRAMANIA

See Elitism, page 95

**Listing 1. Generator for Commander Slog Generator**

```
   10 REM Commander Slog Generator
   20 REM by Paul Skirrow
   30 REM BBC with tape/disc version
   40 REM of Elite
   50 REM (c) Acorn User January 1986
   60 :
   70 f%=OPENOUT("E.SLOG")
   80 REM If you have a tape version of
   90 REM Elite then the file name
  100 REM should be SLOG, not E.SLOG
  110 :
  120 c%=0
  130 FOR 1%=0 TO &4B
  140 READ a$:a%=EVAL("&"+a$)
  150 BPUT#f%,a%
  160 c%=c%+a%
  170 NEXT
  180 FOR 1%=&4C TO &FF
  190 BPUT #f%,0
  200 NEXT
  210 CLOSE#f%
  220 IF c%<>3701 PRINT"DATA is wrong -
correct it"
  230 END
  240 :
  250 DATA 0A,7F,7F,03,32,36,27,98
  260 DATA 00,00,00,00,00,FF,84,08
  270 DATA 00,FF,FF,FF,00,00,04,00
  280 DATA 00,00,00,00,00,00,00,00
  290 DATA 00,00,00,00,00,00,00,00
  300 DATA FF,FF,7F,04,FF,FF,FF,00
  310 DATA 00,00,00,10,F0,00,00,00
  320 DATA 00,00,00,01,00,00,00,00
  330 DATA 00,00,00,00,00,00,00,42
  340 DATA 01,80,16,5F
```

Spectramania, see page 73

### How to enter Spectramania

*Spectramania is made up of three listings. Type each one in separately, saving your typing as frequently as possible in case of accidents or 'crashes'.*

*Listing 1 contains quite a lot of data, so to make sure you have typed the DATA lines in correctly, a checksum has been included, which will report any errors it detects. Before you test the listings, replace line 250 with:*

*250 END*

*Once the program works correctly, enter line 250 as it is printed in the listing and save the program as "SP1".*

*Listing 2 contains all the assembly language used in the game. Don't worry if you are unfamiliar with the BBC assembler, just type in each line as it is printed. If you do make a mistake it will be spotted by the checksum routine at line 6980. To test that you have entered listing 2 correctly, replace line 7040 with:*

*7040 END*

*Save the program with the title "SP2". Now switch to screen mode 6 (or 7 if you have a BBC) and set page to &3000 by typing:*

*PAGE = &3000 <Return>*

*NEW <Return>*

*Load "SP2" again and run it. If an error is reported check your listing and run the program again. When no errors are reported enter line 7040 exactly as it appears in the listing and save the listing as "SP2".*

*The final listing is the main game and as it's a short Basic program it should present no problems. Enter the listing and save it as "SP3". Now CHAIN "SP1". The machine-code will be assembled by listing 2 and then listing 3 will be chained. If any mistakes in listing 3 appear, correct them, save the program again as "SP3" and then run the final listing again.*

**Listing 1. Stores data for the main program**

```
   10 REM Spectramania (1)
   20 REM by David Acton
   30 REM BBC B/B+/128k and Electron
   40 REM (c) Acorn User January 1986
   50 :
   60 MODE 5
   70 VDU 19,3,9,0;0,23;6,23;0;0;0
   80 ENVELOPE 1,2,0,0,0,0,0,0,126,-1,0,
-1,126,63
   90 ENVELOPE 2,2,0,72,-72,0,3,3,126,0,
0,-1,126,63
  100 ENVELOPE 3,3,-4,-1,2,6,6,28,81,-4,
-5,-1,126,63
  110 ENVELOPE 4,3,1,-2,1,1,1,1,126,-1,0
,-1,100,63
  120 *FX 9,1
  130 *FX 10,1
  140 *FX 225
  150 FOR X%=0 TO 31:A%=&3000+640*X%
  160 X%?&CA0=A% DIV256:X%?&CC0=A%:NEXT
  170 T%=0:FOR X%=&B00 TO &C9C STEP4
  180 READ!X%:T%=T%+!X%
  190 NEXT:!&75=RND:!&79=&768553
  200 IFT%<>&3A816AC7 MODE6:PRINT"Data e
rror - please check listing":END
  210 PRINTTAB(4,2)"SPECTRAMANIA"
  220 COLOUR2:PRINTTAB(5,6)"by D Acton"
  230 COLOUR1:PRINTTAB(6,12)"LOADING."
  240 VDU 28,1,22,18,20
  250 PAGE=&3000:CHAIN"SP2"
  260 DATA &B0B0F050,&F00050F0
  270 DATA &D070F0F0,&F050F0F0
  280 DATA &E0B0F0F0,&F0A0F0F0
  290 DATA &7070F0A0,&F000A0F0
  300 DATA &A0A0A0A0,&F0A0
  310 DATA &F0F0F0F0,&30101010
  320 DATA &F0F0F0F0,&30202020
  330 DATA &50505050,&F050
  340 DATA &1000A050,&30307030
  350 DATA &B0B0A0A0,&30B03030
  360 DATA &70705050,&30703030
  370 DATA &200050A0,&3030B030
  380 DATA &30306060,&103030
  390 DATA &60309090,&3060C030
  400 DATA &90306060,&3090C030
  410 DATA &30309090,&203030
  420 DATA &10000000,&30303030
  430 DATA &F0300000,&B0B0F0B0
  440 DATA &F0300000,&7070F070
  450 DATA &20000000,&30303030
  460 DATA &30303030,&1030
  470 DATA &90909030,&30C090
  480 DATA &60606030,&30C060
  490 DATA &30303030,&2030
  500 DATA &F0500000,&E0E0E0F0
  510 DATA &F0F0F000,&30706030
  520 DATA &F0F0F000,&30E0C030
  530 DATA &F0A00000,&70707070
  540 DATA &E0E0E0E0,&50F0
  550 DATA &F0707060,&F0F0F0
  560 DATA &F0F0F0C0,&F0F0F0
  570 DATA &F0F0F0F0,&A0F0
```

Continued ▶

# SPECTRAMANIA

◄ Acton listing 1 continued

```
580 :
590 DATA &71353529,&15511535
600 DATA &192A2315,&42480661
610 DATA &2A33610C,&231C0A2A
620 DATA &3629060C,&421C2A0A
630 DATA &15357429,&36482354
640 DATA &35686219,&62151535
650 DATA &680A3368,&41410962
660 DATA &A626803,&C2A2A0A
670 DATA &2A064444,&1C0A0A2A
680 DATA &29231554,&A367435
690 DATA &33613548,&61192A2A
700 DATA &350C4215,&54740C36
710 DATA &6151C06
720 :
730 DATA &F0C0300,&2060400
740 DATA &2020202,&222A2222
750 DATA &222A2A22,&2C1414EC
760 DATA &2C442C44,&4050404
770 DATA &4050504,&1000009
780 DATA &1020102,0,0
790 DATA &FFF80000,&10002
```

**Listing 2. Contains the assembly language used in Spectramania**

```
10 REM Spectramania (2)
20 REM by David Acton
30 REM for BBC B/B+/128k and Electron
40 REM (c) Acorn User January 1986
50 :
60 HIMEM=&8000:LOMEM=&7500
70 ad=&70:ad2=&72:at=&74
80 rd=&75:rc=&79:ct1=&7C:ct2=&7D
90 ymod=&7E:ymi=&7F:read=&80:end=&84
100 map%=&C00:mcol%=&900:code%=&C64
110 ah%=&CA0:al%=&CC0:mv%=&9AF
120 cb=&C68:cx=&964:cy=&96C:cp=&974
130 xst=&82:frz=&89:cell=&83:mnc=&8A
140 targ=&86:tot=&85:lvl=&87:cst=&88
150 csx=&C70:csy=&C78:cc=&984:cd=&97C
160 csmx=&C80:csmy=&C88:cm=&994
170 cmx=&99F:cmy=&9A7:cj=&98C
180 sw=&C90:sw2=&C98:sc=&99C
190 a=&FFEE:w=&FFF1:b=&FFF4
200 FOR pass%=0 TO 2 STEP2:P%=&2A29
```

Continued bottom left column ►

Acton listing 2 continued

```
210 [OPT pass%
220 .cad
230 TYA:PHA
240 LSR A
250 LSR A
260 LSR A
270 TAY:PLA
280 AND #7
290 CLC
300 ADC al%,Y
310 STA ad
320 LDA #0:STA at
330 ADC ah%,Y
340 STA ad+1
350 TXA
360 ASL A
370 ASL A:ROL at
380 ASL A:ROL at
390 CLC
400 ADC ad
410 STA ad
420 LDA ad+1
430 ADC at
440 STA ad+1
450 RTS
460 .loc
470 TYA:ASL A
480 STA at
490 ASL A
500 ASL A
510 CLC
520 ADC at
530 STA at
540 TXA
550 ADC at
560 RTS
570 .block
580 JSR loc
590 PHA
600 TXA
610 ASL A:ASL A
620 ASL A
630 TAX
```

Continued ►

◄ Continued

```
640 TYA
650 ASL A:ASL A
660 ASL A
670 STA at
680 ASL A
690 ADC at
700 ADC #16
710 TAY
720 JSR cad
730 LDA ad
740 STA ad2
750 LDA ad+1
760 STA ad2+1
770 PLA:TAX
780 LDA map%,X
790 STA at
800 LDA mcol%,X
810 AND #3:TAX
820 LDA code%,X
830 LDX #3
840 .blp LDY #63
850 .blp2 STA (ad),Y
860 DEY:BPL blp2
870 PHA
880 JSR csub2b
890 PLA
900 DEX:BNE blp
910 .bt LDA #1
920 JSR and
930 JSR hor
940 .bl LDA #8
950 JSR and
960 JSR vert
970 .bb LDA ad2
980 SEC
990 SBC #121
1000 STA ad2
1010 LDA ad2+1
1020 SBC #2
1030 STA ad2+1
1040 LDA #4
1050 JSR and
```

Continued ►

◄ Continued

```
1060 JSR hor
1070 .br LDA ad2
1080 SEC
1090 SBC #207
1100 STA ad2
1110 LDA ad2+1
1120 SBC #4
1130 STA ad2+1
1140 LDA #2
1150 JSR and
1160 .vert LDX #3
1170 STA v3+1
1180 .v2 LDY #7
1190 .v3 LDA #0
1200 ORA (ad2),Y
1210 STA (ad2),Y
1220 DEY:BPL v3
1230 JSR csub2
1240 DEX:BNE v2
1250 RTS
1260 .hor LDX #8
1270 LDY #0
1280 STA h2+1
1290 .h2 LDA #0
1300 ORA (ad2),Y
1310 STA (ad2),Y
1320 JSR yadd
1330 DEX:BNE h2
1340 RTS
1350 .and
1360 AND at:BEQ a2
1370 LDA #63
1380 .a2 RTS
1390 .key LDY #&FF
1400 LDA #129
1410 JSR b
1420 CPX #255
1430 RTS
1440 .rand
1450 TXA:PHA
1460 LDY #8
1470 .r1 CLC
1480 LDA rd+3
```

Continued ►

◀ Acton listing 2 continued

```
1490 BPL r3
1500 LDX #2
1510 .r2 LDA rd,X
1520 EOR rc,X
1530 STA rd,X
1540 DEX:BPL r2
1550 SEC
1560 .r3 ROL rd
1570 ROL rd+1
1580 ROL rd+2
1590 ROL rd+3
1600 DEY:BPL r1
1610 PLA:TAX
1620 LDA rd+3
1630 RTS
1640 .adp
1650 LDX #sw2 MOD256
1660 LDY #sw2 DIV256
1670 LDA #7
1680 JSR w
1690 LDX #21
1700 LDY #0
1710 .adsc SED
1720 TXA
1730 CLC
1740 ADC sc
1750 STA sc
1760 TYA
1770 ADC sc+1
1780 STA sc+1
1790 LDA sc+2
1800 ADC #0
1810 STA sc+2
1820 CLD
1830 .score LDA #30
1840 JSR a
1850 LDX #2
1860 .sc2 LDA sc,X
1870 LSR A:LSR A
1880 LSR A:LSR A
1890 CLC:ADC #48
1900 JSR a
1910 LDA sc,X
1920 AND #15
1930 CLC:ADC #48
1940 JSR a
1950 DEX
1960 BPL sc2
1970 RTS
1980 .sound
1990 STX sw+6
2000 STY sw+2
2010 PHA
2020 AND #252
2030 STA sw+4
2040 PLA
2050 AND #3
2060 STA sw
2070 LDX #sw MOD256
2080 LDY #sw DIV256
2090 LDA #7
2100 JMP w
2110 .vd19
2120 LDA #19:JSR a
2130 TXA:JSR a
2140 TYA:JSR a
2150 LDA #0:JSR a
2160 JSR a:JMP a
2170 .char LDA cb,X
```

Continued ▶

◀ Continued

```
2180 ASL A:ASL A
2190 ASL A:ASL A
2200 ASL A
2210 STA read
2220 LDA #&B
2230 STA read+1
2240 LDY cy,X
2250 LDA cx,X
2260 TAX
2270 JSR charsub
2280 .char2 LDX ymi
2290 .char3
2300 LDA (read),Y
2310 ORA (ad),Y
2320 STA (ad),Y
2330 INY
2340 DEX:BNE char3
2350 LDX ymod
2360 BNE char4
2370 JMP char5
2380 .char4
2390 LDA (read),Y
2400 ORA (ad2),Y
2410 STA (ad2),Y
2420 INY
2430 DEX:BNE char4
2440 .char5
2450 DEC ct1:BNE char2
2460 LDA read
2470 CLC
2480 ADC #32
2490 STA read
2500 JSR csub2
2510 DEC ct2:BNE char2
2520 RTS
2530 .del LDY cy,X
2540 LDA cx,X
2550 TAX
2560 JSR charsub
2570 .del2 LDX ymi
2580 .del3 LDA (ad),Y
2590 AND #15
2600 STA (ad),Y
2610 INY
2620 DEX:BNE del3
2630 LDX ymod
2640 BNE del4
2650 JMP del5
2660 .del4
2670 LDA (ad2),Y
2680 AND #15
2690 STA (ad2),Y
2700 INY
2710 DEX:BNE del4
2720 .del5
2730 DEC ct1:BNE del2
2740 JSR csub2
2750 DEC ct2:BNE del2
2760 RTS
2770 .charsub
2780 TYA:PHA
2790 AND #7
2800 STA ymod
2810 PLA:TAY
2820 JSR cad
2830 LDA ad
2840 CLC:ADC #120
2850 STA ad2
2860 LDA ad+1
```

Continued ▶

◀ Continued

```
2870 ADC #2
2880 STA ad2+1
2890 LDY #0
2900 LDA #8
2910 SEC:SBC ymod
2920 STA ymi
2930 LDA #4
2940 STA ct1
2950 LDA #2
2960 STA ct2
2970 RTS
2980 .csub2 LDA ad2
2990 CLC:ADC #128
3000 STA ad2
3010 LDA ad2+1
3020 ADC #2
3030 STA ad2+1
3040 .csub2b
3050 LDA ad
3060 CLC:ADC #128
3070 STA ad
3080 LDA ad+1
3090 ADC #2
3100 STA ad+1
3110 LDY #0
3120 LDA #4
3130 STA ct1
3140 RTS
3150 .main JSR spec
3160 JSR spb
3170 LDA end
3180 BNE e2
3190 LDX #14
3200 LDY #0
3210 .ent LDA #255
3220 STA &3B0F,Y
3230 JSR yadd
3240 DEX:BNE ent
3250 .e2 LDX #7
3260 .m2 STX xst
3270 TXA
3280 AND #3
3290 BNE m3
3300 .synchro
3310 LDA #19:JSR b
3320 LDX xst
3330 .m3 LDA cp,X
3340 BNE m3b
3350 JMP mn2
3360 .m3b LDA frz
3370 BEQ m4
3380 CPX #3:BCC m4
3390 JSR char
3400 LDX xst
3410 JMP mn2
3420 .m4 LDA cc,X
3430 BEQ m5
3440 JSR del
3450 LDX xst
3460 LDA cd,X
3470 LSR A
3480 BCC m4b
3490 LDA cy,X
3500 SEC:SBC #3
3510 STA cy,X
3520 JMP m4e
3530 .m4b LSR A
3540 BCC m4c
```

Continued ▶

◄ Acton listing 2 continued

```
3550 INC cx,X
3560 JMP m4e
3570 .m4c LSR A
3580 BCC m4d
3590 LDA cy,X
3600 CLC:ADC #3
3610 STA cy,X
3620 JMP m4e
3630 .m4d LSR A
3640 BCC m4e
3650 DEC cx,X
3660 .m4e JSR char
3670 LDX xst
3680 DEC cc,X:BEQ m5
3690 JMP mn
3700 .m5 LDY cmy,X
3710 LDA cmx,X
3720 TAX
3730 JSR loc
3740 TAX
3750 LDA map%,X
3760 STA cell
3770 LDX xst
3780 CPX #0:BNE m6
3790 JSR change
3800 LDX #158
3810 JSR key
3820 BNE m5b
3830 LDA #8
3840 JMP m5e
3850 .m5b LDX #189
3860 JSR key
3870 BNE m5c
3880 LDA #2
3890 JMP m5e
3900 .m5c LDX #183
3910 JSR key
3920 BNE m5d
3930 LDA #1
3940 JMP m5e
3950 .m5d LDX #151
3960 JSR key
3970 BNE m5f
3980 LDA #4
3990 .m5e LDX xst
4000 JSR ok
4010 JMP mn
4020 .m5f LDA #16
4030 STA cd
4040 JMP mn
4050 .m6 CPX #3
4060 BCS m7
4070 .m6b LDA cell
4080 LSR A:LSR A
4090 LSR A:LSR A
4100 AND #3:TAY
4110 LDA mv%,Y
4120 JSR ok
4130 JMP mn
4140 .m7 LDA cm,X
4150 BNE m8
4160 LDA cx,X
4170 CMP cx
4180 BEQ m7c
4190 BCC m7b
4200 LDA cell
4210 AND #8
4220 BNE m7c
```

Continued ►

◄ Continued

```
4230 LDA #8
4240 JMP m7e
4250 .m7b LDA cell
4260 AND #2
4270 BNE m7c
4280 LDA #2
4290 JMP m7e
4300 .m7c LDA cy,X
4310 CMP cy
4320 BEQ m7f
4330 BCC m7d
4340 LDA cell
4350 AND #1
4360 BNE m7f
4370 LDA #1
4380 JMP m7e
4390 .m7d LDA cell
4400 AND #4
4410 BNE m7f
4420 LDA #4
4430 .m7e JSR ok
4440 JMP mn
4450 .m7f LDA #1
4460 STA cm,X
4470 JSR rand
4480 AND #3
4490 ORA #1
4500 STA cj,X
4510 JMP m6b
4520 .m8 LDA cell
4530 AND #64
4540 BEQ m6b
4550 DEC cj,X
4560 BNE m6b
4570 LDA #0
4580 STA cm,X
4590 JMP m7
4600 .mn LDX xst
4610 BEQ mn2
4620 .col LDA cx,X
4630 SEC:SBC cx
4640 BCS c2
4650 LDA cx
4660 SEC:SBC cx,X
4670 .c2 CMP #2
4680 BCS c4
4690 LDA cy,X
4700 SEC:SBC cy
4710 BCS c3
4720 LDA cy
4730 SEC:SBC cy,X
4740 .c3 CMP #4
4750 .c4 BCS mn2
4760 CPX #3
4770 BCC c5
4780 LDA mnc
4790 BNE c4b
4800 LDA #1
4810 STA end
4820 JMP mn2
4830 .c4b JSR del
4840 LDX #0
4850 JSR char
4860 LDX xst
4870 JSR res2
4880 LDA #200
4890 STA cc,X
4900 LDX #0
```

Continued ►

◄ Continued

```
4910 LDY #16
4920 JSR adsc
4930 LDX xst
4940 JMP mn2
4950 .c5 LDA#0
4960 STA cp,X
4970 JSR del
4980 LDX #7
4990 LDY #15
5000 JSR vd19
5010 LDX #0
5020 LDY #5
5030 JSR adsc
5040 LDX #0
5050 JSR char
5060 LDX xst
5070 LDA #200
5080 CPX #1:BNE c6
5090 STA frz
5100 JMP mn2
5110 .c6 STA mnc
5120 .mn2
5130 DEX:BMI m9
5140 JMP m2
5150 .m9
5160 LDA end:BNE out
5170 LDA targ
5180 CMP tot:BEQ out
5190 JMP main
5200 .out RTS
5210 .ok TAY
5220 AND cell:BNE ok6
5230 CPY #1
5240 BNE ok2
5250 DEC cmy,X
5260 JMP ok5
5270 .ok2
5280 CPY #2:BNE ok3
5290 INC cmx,X
5300 JMP ok5
5310 .ok3
5320 CPY #4:BNE ok4
5330 INC cmy,X
5340 JMP ok5
5350 .ok4 DEC cmx,X
5360 .ok5 TYA
5370 STA cd,X
5380 LDA #8
5390 STA cc,X
5400 RTS
5410 .ok6 LDA #1
5420 STA cc,X
5430 LDA #16
5440 STA cd,X
5450 RTS
5460 .change LDA cd
5470 CMP #16:BEQ ch6
5480 LDY cmy
5490 LDX cmx
5500 JSR loc
5510 TAX
5520 LDA mcol%,X
5530 STA cst
5540 CMP #1:BNE ch2
5550 INC mcol%,X
5560 JMP ch5
5570 .ch2
5580 CMP #2:BNE ch3
```

Continued ►

◀ Acton listing 2 continued

```
 5590 LDA lvl
 5600 CMP #1:BEQ ch5
 5610 CMP #3:BEQ ch4
 5620 INC mcol%,X
 5630 JMP ch5
 5640 .ch3 LDA lvl
 5650 CMP #2:BEQ ch5
 5660 CMP #4:BEQ ch4
 5670 DEC mcol%,X
 5680 .ch4 DEC mcol%,X
 5690 .ch5 LDA mcol%,X
 5700 SEC:SBC cst
 5710 CLC:ADC tot
 5720 CMP tot
 5730 PHP
 5740 STA tot
 5750 LDY cmy
 5760 LDX cmx
 5770 JSR block
 5780 LDX xst
 5790 JSR char
 5800 PLP
 5810 BCC ch6
 5820 BEQ ch6
 5830 JMP adp
 5840 .ch6 RTS
 5850 .res2
 5860 LDX #5
 5870 LDY #3
 5880 LDA #65
 5890 JSR sound
 5900 LDX xst
 5910 .reset
 5920 LDA csx,X
 5930 STA cx,X
 5940 LDA csy,X
 5950 STA cy,X
 5960 LDA csmx,X
 5970 STA cmx,X
 5980 LDA csmy,X
 5990 STA cmy,X
 6000 LDA #16
 6010 STA cd,X
 6020 JSR rand
 6030 AND #15
```

Continued next column ▶

◀ Continued

```
 6040 ADC #5
 6050 STA cc,X
 6060 JSR rand
 6070 AND #7
 6080 ADC #2
 6090 STA cj,X
 6100 RTS
 6110 .bar PHA
 6120 JSR cad
 6130 PLA
 6140 LSR A:LSR A
 6150 LSR A
 6160 LDY #0
 6170 TAX
 6180 BEQ br3
 6190 .br2 LDA #3
 6200 STA (ad),Y
 6210 INY
 6220 LDA #15
 6230 STA (ad),Y
 6240 INY
 6250 STA (ad),Y
 6260 INY
 6270 LDA #3
 6280 STA (ad),Y
 6290 TYA
 6300 CLC:ADC #5
 6310 TAY
 6320 DEX
 6330 BNE br2
 6340 .br3 LDX #7
 6350 LDA #0
 6360 .br4 STA (ad),Y
 6370 INY
 6380 DEX:BPL br4
 6390 RTS
 6400 .spec LDA frz
 6410 BEQ spc2
 6420 DEC frz
 6430 LDA frz
 6440 LDX #10
 6450 JSR specsub1
 6460 JSR b
 6470 LDA frz
 6480 AND #252
```

Continued next column ▶

◀ Continued

```
 6490 ORA #1
 6500 JSR specsub2
 6510 .spc2
 6520 LDA mnc:BEQ spc3
 6530 DEC mnc
 6540 LDA mnc
 6550 LDX #50
 6560 JSR specsub1
 6570 INX
 6580 JSR b
 6590 LDA mnc
 6600 AND #252
 6610 ORA #2
 6620 JMP specsub2
 6630 .spc3
 6640 LDA frz:BNE spc4
 6650 LDA mnc:BNE spc4
 6660 LDX #7
 6670 LDY #7
 6680 JMP vd19
 6690 .spc4 RTS
 6700 .spb LDX #2
 6710 .spb2 LDA cp,X
 6720 BNE spb3
 6730 JSR rand
 6740 BNE spb3
 6750 JSR rand
 6760 AND #7
 6770 BNE spb3
 6780 INC cp,X
 6790 JSR reset
 6800 .spb3 DEX
 6810 BNE spb2
 6820 RTS
 6830 .yadd TYA
 6840 CLC:ADC #8
 6850 TAY
 6860 RTS
 6870 .specsub1
 6880 LDY #10
 6890 JSR bar
 6900 LDA #21
 6910 LDX #5
 6920 RTS
 6930 .specsub2
 6940 LDX #1
```

Continued below left ▶

◀ Continued

```
 6950 LDY #2
 6960 JMP sound
 6970 ]NEXT
 6980 REM Checksum
 6990 total%=0
 7000 FOR byte%=&2A29 TO P%
 7010 total%=total%+?byte%:NEXT
 7020 IF total%<>157837 CLEAR:MODE6:PRIN
T"Checksum error - please check listing.
":END
 7030 IF FNelk THEN ?synchro=&EA:synchro
!1=&EAEAEAEA
 7040 CLS:PAGE=&1900:CHAIN"SP3"
 7050 DEF FNelk=(INKEY(-256)=1)
```

**Listing 3. Spectramania – the Main Game**

```
   10 REM Spectramania (3)
   20 REM by David Acton
   30 REM for BBC B/B+/128k and Electron
   40 REM (c) Acorn User January 1986
   50 :
   60 MODE2:VDU23,1,0,0;0;0;
   70 HIMEM=&2A29
   80 PROCvar
   90 REPEAT
  100 FOR X%=4 TO 7
  110 PROCr(X%,7):PROCr(X%+4,0)
  120 PROCr(X%+8,6):NEXT
  130 CLS:PROCreset
  140 ?cx=34:?cy=44:?end=1
```

Continued ▶

# SPECTRAMANIA

◀ **Acton listing 3 continued**

```
  150 !cp=0:cp!4=&1010101
  160 COLOUR1:PRINTTAB(4,2)"SPECTRAMANIA"
  170 COLOUR2:PRINTTAB(4,6)"Mega-scores:"
  180 FOR U%=1 TO 10
  190 COLOUR1:PRINTTAB(0,7+2*U%);U%
  200 COLOUR2:PRINTTAB(3,7+2*U%)RIGHT$("0
00"+STR$hs%(10-U%),6)" ";
  210 COLOUR3:PRINThs$(10-U%)
  220 NEXT
  230 COLOUR2:PRINTTAB(1,30)"PRESS SPACE
BAR TO"TAB(8,31)"PLAY";
  240 REPEAT:?cx=76-?cx:CALL&2C7F
  250 UNTIL INKEY(-99):CLS
  260 lives=3:round=1:?lvl=1:!sc=0
  270 REPEAT:PROCinfo:PROCreset:*FX 15
  280 FOR Y%=0 TO 9:FOR X%=0 TO 9
  290 CALL&2A64:NEXT,
  300 COLOUR 7:CALL&2B63
  310 PRINTTAB(14,0)RIGHT$("0"+STR$hs%(9)
,6)
  320 COLOUR2:PRINTTAB(0,1)"FR"SPC8"PW"
  330 COLOUR1:PRINTTAB(7,0)"LVS: ";lives-
1
  340 PROCdisp(0):COLOUR128:COLOUR2
  350 PRINTTAB(7,19)"READY!"
  360 PROCd(200):PROCcl
  370 PRINTTAB(7,18)"CHANGE"TAB(9,19)"TO"
  380 COLOUR131:IF?lvl=1 OR?lvl=3 COLOUR1
30
  390 PRINTTAB(9,20)"  "TAB(9,21)"  "
  400 COLOUR128:COLOUR7
  410 *FX178
  420 CALL&2C7F:PROCr(7,7)
  430 *FX178,255
  440 IF ?end PROCsplat:GOTO560
  450 PROCcl:COLOUR5
  460 PRINTTAB(7,18)"BONUS:"
  470 B%=250*(round+5*(?lvl-1))
  480 PRINTTAB(8,20);B%:PROCd(100)
  490 X%=80:Y%=0
  500 FOR I%=1 TO B%/50:CALL&2B4A
  510 SOUND 1,-10,200,1
  520 PROCd(10):NEXT
  530 PROCd(200):round=round+1
  540 IF round=6 round=1:?lvl=?lvl+1:IF?l
vl<4 lives=lives+1
  550 IF ?lvl=6 ?lvl=5
  560 UNTIL lives=0
  570 PROCcl:COLOUR2
  580 PRINTTAB(8,18)"GAME"TAB(8,20)"OVER"
  590 RESTORE:PROCtune:PROCd(200):S%=0
  600 FOR b%=0 TO 2:S%=S%+((b%?sc)AND15)*
10^(b%*2)+((b%?sc)DIV16)*10^(b%*2+1):NEXT
  610 IFS%<hs%(0) GOTO720
  620 p%=0:REPEATp%=p%+1
  630 UNTIL S%<hs%(p%) OR p%=10
  640 p%=p%-1:IFp%>0 FORX%=0TOp%-1:hs%(X%
)=hs%(X%+1):hs$(X%)=hs$(X%+1):NEXT
  650 VDU 20,12:COLOUR14
  660 PRINTTAB(8,6)"WOW!":COLOUR3
  670 PRINTTAB(3,9)"WHAT A SCORE"
  680 COLOUR6:*FX 15,1
  690 PRINTTAB(2,12)"Enter your name"
  700 COLOUR7:INPUTTAB(5,15)hs$(p%)
  710 hs%(p%)=S%
  720 UNTILFALSE
  730 DEF PROCvar:round=1
  740 DIM hs%(10),hs$(10),P%(1),S$(1)
```

**Continued** ▶

◀ **Continued**

```
  750 FOR X%=0 TO 9:hs%(X%)=2000*(X%+1)
  760 hs$(X%)="Ray  Robot":NEXT
  770 mcol%=&900:cx=&964:cy=&96C
  780 cc=&984:cp=&974:tot=&85:targ=&86
  790 end=&84:lvl=&87:frz=&89:mnc=&8A
  800 sc=&99C
  810 !&9AF=&8040201:ENDPROC
  820 DEF PROCr(X%,Y%)
  830 CALL&2BA1:ENDPROC
  840 DEF PROCreset
  850 FOR X%=0 TO 99:X%?mcol%=1:NEXT
  860 FOR X%=0 TO 7:CALL &2F26:NEXT
  870 ?cc=1:?end=0:?tot=0
  880 ?targ=176
  890 IF ?lvl=1 OR ?lvl=3 THEN ?targ=88
  900 ?frz=0:?mnc=0
  910 FOR X%=53 TO 56
  920 X%?mcol%=0:X%?(mcol%+10)=0:NEXT
  930 ng=round:IF ng<3 ng=3
  940 !cp=0:cp!4=0
  950 FOR X%=1 TO ng:X%?(cp+2)=1:NEXT
  960 ?cp=1
  970 ENDPROC
  980 DEF PROCd(T):TIME=0
  990 REPEAT UNTIL TIME>T:ENDPROC
 1000 DEF PROCcl
 1010 FOR X%=3 TO 6:FOR Y%=5 TO 6
 1020 CALL &2A64:NEXT,:ENDPROC
 1030 DEF PROCsplat:PROCdisp(3)
 1040 PROCd(100):PROCcl:lives=lives-1
 1050 PRINT TAB(7,19)"SPLAT!"
 1060 FOR X=99 TO 33 STEP-33
 1070 FOR Y=1 TO 6
 1080 SOUND 1,1,X+4*Y,1:NEXT,
 1090 FOR X=30 TO 3 STEP -3
 1100 SOUND 1,2,X,2:NEXT
 1110 PROCd(200):ENDPROC
 1120 DEF PROCdisp(U%)
 1130 FOR X%=U% TO 7:IFcp?X% CALL&2BB9
 1140 NEXT:ENDPROC
 1150 DEF PROCinfo:CLS:COLOUR2
 1160 PRINT TAB(6,13)"LEVEL  ";?lvl
 1170 COLOUR3
 1180 PRINT TAB(6,17)"ROUND  ";round
 1190 TIME=0:REPEAT
 1200 PROCq(41):PROCq(49)
 1210 PROCq(53):PROCq(69)
 1220 UNTIL TIME>300:CLS:ENDPROC
 1230 DEF PROCq(P%)
 1240 PROCts(P%):PROCts(P%-4)
 1250 PROCts(P%):ENDPROC
 1260 DEF PROCts(P%):FOR Y%=1 TO 3
 1270 SOUND Y%,1,P%,2:NEXT:ENDPROC
 1280 DEF PROCtune:P%(0)=1:P%(1)=1
 1290 READ S$(0),S$(1)
 1300 REPEAT:FOR Y%=0 TO 1
 1310 IF Y%=1 AND FNelk THEN GOTO 1350
 1320 IF P%(Y%)>LENS$(Y%) ORADVAL(-6-Y%)=
0 GOTO1350
 1330 V=EVAL("&"+MID$(S$(Y%),P%(Y%),2))
 1340 SOUND Y%+1,4,(V AND63)*4+1,(V AND19
2)/16:P%(Y%)=P%(Y%)+2
 1350 NEXT:UNTIL P%(0)>LENS$(0):ENDPROC
 1360 DATA 6E6A67A267AA6965629D5E9D676564
A9676564E2
 1370 DATA 9E9E9D9B9D999B99989B919BDD
 1380 DEF FNelk=(INKEY(-256)=1)
```

See into the Third Dimension, page 82

**Listing 1. Provides 3D definition**

```
   10 REM Listing 1
   20 REM by Jim McGregor and Alan Watt
   30 REM BBC B/B+/128k and Electron
   40 REM (c) Acorn User January 1986
   50 :
   60 rho=2000:theta=0:phi=60:d=1500
   70 PROCinitviewtransform(rho,theta,ph
i)
   80 MODE 0
   90 VDU 29,640;512;
  100 z=0:endofcontour=9999
  110 RESTORE
  120 REPEAT
  130 READ x,y
  140 PROCworldtoscreen:MOVE xs,ys
  150 REPEAT
  160 READ x,y
  170 IF x<>endofcontour THEN PROCworldt
oscreen:DRAW xs,ys
  180 UNTIL x=endofcontour OR y=endofcon
tour
  190 z=z+100
  200 UNTIL y=endofcontour
  210 END
  220 :
  230 DEF PROCworldtoscreen
  240 PROCviewtransform(x-640,y-512,z)
  250 PROCperspecttransform(xe,ye,ze,d)
  260 ENDPROC
  270 :
  280 DATA 0,0, 0,800, 800,800
  290 DATA 800,0, 0,0, 9999,0
  300 DATA 100,100, 100,700, 700,700
  310 DATA 700,100, 100,100, 9999,0
  320 DATA 200,200, 200,600, 600,600
  330 DATA 600,200, 200,200, 9999,0
  340 DATA 300,300, 300,500, 500,500
  350 DATA 500,300, 300,300, 9999,9999
  360 :
  370 DEF PROCinitviewtransform(rho,thet
a,phi)
  380 LOCAL sintheta,costheta,sinphi,cos
phi
  390 sintheta=SIN(RAD(theta))
  400 costheta=COS(RAD(theta))
  410 sinphi=SIN(RAD(phi))
  420 cosphi=COS(RAD(phi))
  430 va=-sintheta:vb=costheta
  440 ve=-costheta*cosphi
  450 vf=-sintheta*cosphi
  460 vg=sinphi
  470 vi=-costheta*sinphi
  480 vj=-sintheta*sinphi
  490 vk=-cosphi:vl=rho
  500 ENDPROC
  510 DEF PROCviewtransform(x,y,z)
  520 xe=va*x+vb*y
  530 ye=ve*x+vf*y+vg*z
  540 ze=vi*x+vj*y+vk*z+vl
  550 ENDPROC
  560 DEF PROCperspecttransform(xe,ye,ze
,d)
  570 xs=d*xe/ze
  580 ys=d*ye/ze
  590 ENDPROC
```

**Listing 2. Provides 3D definition through lofting**

```
   10 REM Listing 2
   20 REM by Jim McGregor and Alan Watt
   30 REM BBC B/B+/128k and Electron
   40 REM (c) Acorn User January 1986
   50 :
   60 DIM vertex(3,40),surface(40,3)
   70 rho=250:theta=15:phi=28:d=600
   80 PROCinitviewtransform(rho,theta,phi)
   90 MODE 0:VDU 29,640;512;
  100 PROCgeneratecontours
  110 PROCtriangulate
  120 PRINT"noofsurfaces is",noofsurfaces
  130 FOR surfaceno=1 TO noofsurfaces
  140 PROCplotsurfaces
  150 NEXT surfaceno
  160 END
  170 :
  180 DEF PROCplotsurfaces
  190 LOCAL vertexno,startx,starty
  200 PROCscreenvertex(surfaceno,1)
  210 MOVE xs,ys:startx=xs:starty=ys
  220 FOR vertexno=2 TO 3
  230 PROCscreenvertex(surfaceno,vertexno)
  240 DRAW xs,ys
  250 NEXT vertexno
  260 DRAW startx,starty
  270 ENDPROC
  280 DEF PROCscreenvertex(s,v)
  290 PROCviewtransform(vertex(1,surface(s,
v)),vertex(2,surface(s,v)),vertex(3,surface
(s,v)))
  300 PROCperspecttransform(xe,ye,ze,d)
  310 ENDPROC
  320 DEF PROCgeneratecontours
  330 r1=150:i=0
  340 FOR theta=-90 TO 90 STEP 9
  350 i=i+1:r11=r1+RND(16)-6:thetar=theta+R
ND(3)-1.5
  360 vertex(1,i)=r11*COS(RAD(thetar))
  370 vertex(2,i)=r11*SIN(RAD(thetar))
  380 vertex(3,i)=0
  390 NEXT theta
  400 r2=80
  410 FOR theta=-90 TO 90 STEP 10
  420 i=i+1:r22=r2+RND(12)-6:thetar=theta+R
ND(2)-1
  430 vertex(1,i)=r22*COS(RAD(thetar))
  440 vertex(2,i)=r22*SIN(RAD(thetar))
  450 vertex(3,i)=100
  460 NEXT theta
  470 ENDPROC
  480 DEF PROCtriangulate
  490 i=0:p=1:q=22
  500 curpx=vertex(1,p):curpy=vertex(2,p)
  510 curqx=vertex(1,q):curqy=vertex(2,q)
  520 nextpx=vertex(1,p+1):nextpy=vertex(2,
p+1)
  530 nextqx=vertex(1,q+1):nextqy=vertex(2,
q+1)
  540 REPEAT
  550 IF FNdistpq<=FNdistqp THEN PROCfixpqq
 ELSE PROCfixqpp
  560 UNTIL p=20 OR q=39
  570 noofsurfaces=i
  580 ENDPROC
  590 DEF PROCfixpqq
  600 i=i+1
  610 surface(i,1)=p:surface(i,2)=q
```

Continued ►

◀ **McGregor & Watt listing 2 continued**

```
  620 surface(i,3)=q+1
  630 curqx=nextqx:curqy=nextqy:q=q+1
  640 nextqx=vertex(1,q+1)
  650 nextqy=vertex(2,q+1)
  660 ENDPROC
  670 DEF PROCfixqpp
  680 i=i+1
  690 surface(i,1)=q:surface(i,2)=p
  700 surface(i,3)=p+1
  710 curpx=nextpx:curpy=nextpy:p=p+1
  720 nextpx=vertex(1,p+1)
  730 nextpy=vertex(2,p+1)
  740 ENDPROC
  750 DEF FNdistpq
  760 sqrx=(curpx-nextqx)*(curpx-nextqx)
  770 sqry=(curpy-nextqy)*(curpy-nextqy)
  780 =SQR(ABS(sqrx+sqry))
  790 DEF FNdistqp
  800 sqrx=(curqx-nextpx)*(curqx-nextpx)
  810 sqry=(curqy-nextpy)*(curqy-nextpy)
  820 =SQR(ABS(sqrx+sqry))
  830 :
  840 DEF PROCinitviewtransform(rho,theta,p
hi)
  850 LOCAL sintheta,costheta,sinphi,cosphi
  860 sintheta=SIN(RAD(theta))
  870 costheta=COS(RAD(theta))
  880 sinphi=SIN(RAD(phi))
  890 cosphi=COS(RAD(phi))
  900 va=-sintheta:vb=costheta
  910 ve=-costheta*cosphi
  920 vf=-sintheta*cosphi
  930 vg=sinphi
  940 vi=-costheta*sinphi
  950 vj=-sintheta*sinphi
  960 vk=-cosphi:vl=rho
  970 ENDPROC
  980 DEF PROCviewtransform(x,y,z)
  990 xe=va*x+vb*y
 1000 ye=ve*x+vf*y+vg*z
 1010 ze=vi*x+vj*y+vk*z+vl
 1020 ENDPROC
 1030 DEF PROCperspecttransform(xe,ye,ze,d)
 1040 xs=d*xe/ze:ys=d*ye/ze
 1050 ENDPROC
```

**Listing 3. Provides definition through rotational sweeping**

```
   10 REM Listing 3
   20 REM by Jim McGregor and Alan Watt
   30 REM BBC B/B+/128k and Electron
   40 REM (c) Acorn User January 1986
   50 :
   60 CLS
   70 rho=700:theta=45:phi=45:d=1000
   80 PROCinitviewtransform(rho,theta,ph
i)
   90 MODE 0
  100 VDU 29,640;512;
  110 RESTORE
  120 READ oldx,oldy
  130 oldx=oldx-640:oldy=oldy-512
  140 FOR point = 1 TO 6
  150 READ x,y:x=x-640:y=y-512
  160 PROCplotplane
```

Continued ▶

◀ **Continued**

```
  170 oldx=x:oldy=y
  180 NEXT point
  190 END
  200 :
  210 DEF PROCplotplane
  220 PROCworldtoscreen(x,y,0)
  230 MOVE xs,ys
  240 PROCworldtoscreen(oldx,oldy,0)
  250 DRAW xs,ys
  260 PROCworldtoscreen(oldx,oldy,150)
  270 DRAW xs, ys
  280 PROCworldtoscreen(x,y,150)
  290 DRAW xs, ys
  300 PROCworldtoscreen(x,y,0)
  310 DRAW xs, ys
  320 ENDPROC
  330 DEF PROCworldtoscreen(x,y,z)
  340 PROCviewtransform(x,y,z)
  350 PROCperspecttransform(xe,ye,ze,d)
  360 ENDPROC
  370 :
  380 DATA 200,200, 300,200, 300,500
  390 DATA 800,500, 800,700, 200,700
  400 DATA 200,200
  410 :
  420 DEF PROCinitviewtransform(rho,thet
a,phi)
  430 LOCAL sintheta,costheta,sinphi,cos
phi
  440 sintheta=SIN(RAD(theta))
  450 costheta=COS(RAD(theta))
  460 sinphi=SIN(RAD(phi))
  470 cosphi=COS(RAD(phi))
  480 va=-sintheta:vb=costheta
  490 ve=-costheta*cosphi
  500 vf=-sintheta*cosphi
  510 vg=sinphi
  520 vi=-costheta*sinphi
  530 vj=-sintheta*sinphi
  540 vk=-cosphi:vl=rho
  550 ENDPROC
  560 DEF PROCviewtransform(x,y,z)
  570 xe=va*x+vb*y
  580 ye=ve*x+vf*y+vg*z
  590 ze=vi*x+vj*y+vk*z+vl
  600 ENDPROC
  610 DEF PROCperspecttransform(xe,ye,ze
,d)
  620 xs=d*xe/ze
  630 ys=d*ye/ze
  640 ENDPROC
```

**Listing 4. Defines a wireframe wineglass in 3D**

```
   10 REM Listing 4
   20 REM by Jim McGregor and Alan Watt
   30 REM BBC B/B+/128k and Electron
   40 REM (c) Acorn User January 1986
   50 :
   60 REM Set PAGE to &1600 before loadin
g program
   70 IF PAGE>&1600 THEN VDU7:PRINT"Error
, move PAGE down to &1600":END
   80 DIM object(3,78),scrx(78),scry(78)
   90 MODE 0:PROCinitialise
```

Continued ▶

◀ **McGregor & Watt listing 4 continued**

```
  100 PROCgenerateandplotsection(225,125,
800,370)
  110 PROCgenerateandplotsection(25,25,37
0,20)
  120 PROCgenerateandplotsection(160,160,
20,0)
  130 PROCmotif(125,175,240)
  140 END
  150 DEF PROCplotsection
  160 MOVE scrx(1),scry(1)
  170 FOR i=2 TO 74
  180 IF i=38 THEN MOVE scrx(i),scry(i) E
LSE DRAW scrx(i),scry(i)
  190 NEXT i
  200 ENDPROC
  210 DEF PROCworldtoscreen(noofvertices)
  220 FOR i=1 TO noofvertices
  230 PROCviewtransform(object(1,i),objec
t(2,i),object(3,i))
  240 PROCperspecttransform(xe,ye,ze,d)
  250 scrx(i)=xs:scry(i)=ys
  260 NEXT i
  270 ENDPROC
  280 DEF PROCgeneratecircle(r,z)
  290 FOR theta=0 TO 360 STEP 10
  300 i=i+1
  310 object(1,i)=r*COS(RAD(theta))
  320 object(2,i)=r*SIN(RAD(theta))
  330 object(3,i)=z
  340 NEXT theta
  350 ENDPROC
  360 DEF PROCinitialise
  370 rho=2300:theta=0:phi=60:d=1800
  380 PROCinitviewtransform(rho,theta,phi
)
  390 VDU 29,640;200;
  400 dx=rho*COS(RAD(90-phi))
  410 slope=0.2:rb=125
  420 ENDPROC
  430 DEF PROCplotedges
  440 MOVE scrx(1),scry(1)
  450 DRAW scrx(3),scry(3)
  460 MOVE scrx(2),scry(2)
  470 DRAW scrx(4),scry(4)
  480 ENDPROC
  490 DEF PROCfindedges(r,z)
  500 gamma=ACS(r/dx)
  510 i=i+1
  520 object(1,i)=COS(gamma)*r
  530 object(2,i)=-SIN(gamma)*r
  540 object(3,i)=z
  550 i=i+1
  560 object(1,i)=COS(gamma)*r
  570 object(2,i)=SIN(gamma)*r
  580 object(3,i)=z
  590 ENDPROC
  600 DEF PROCgenerateandplotsection(rt,r
b,zt,zb)
  610 i=0
  620 PROCgeneratecircle(rt,zt)
  630 PROCgeneratecircle(rb,zb)
  640 PROCworldtoscreen(74)
  650 PROCplotsection
  660 i=0
  670 PROCfindedges(rt,zt)
  680 PROCfindedges(rb,zb)
  690 PROCworldtoscreen(4)
  700 PROCplotedges
```

**Continued** ▶

◀ **Continued**

```
  710 ENDPROC
  720 DEF PROCmotif(z1,z2,z3)
  730 r1=rb+slope*z1:r2=rb+slope*z2
  740 r3=rb+slope*z3:i=0
  750 z1=z1+370:z2=z2+370:z3=z3+370
  760 FOR angle=0 TO 330 STEP 30
  770 i=i+1
  780 cos=COS(RAD(angle))
  790 sin=SIN(RAD(angle))
  800 object(1,i)=r1*cos
  810 object(2,i)=r1*sin:object(3,i)=z1
  820 object(1,i+12)=r2*COS(RAD(angle-5))
  830 object(2,i+12)=r2*SIN(RAD(angle-5))
  840 object(3,i+12)=z2
  850 object(1,i+24)=r2*COS(RAD(angle+5))
  860 object(2,i+24)=r2*SIN(RAD(angle+5))
  870 object(3,i+24)=z2
  880 object(1,i+36)=r3*cos
  890 object(2,i+36)=r3*sin
  900 object(3,i+36)=z3
  910 NEXT angle
  920 PROCworldtoscreen(48)
  930 FOR motif=1 TO 12
  940 MOVE scrx(motif),scry(motif)
  950 DRAW scrx(motif+12),scry(motif+12)
  960 DRAW scrx(motif+36),scry(motif+36)
  970 DRAW scrx(motif+24),scry(motif+24)
  980 DRAW scrx(motif),scry(motif)
  990 MOVE scrx(motif),scry(motif)
 1000 DRAW scrx(motif+36),scry(motif+36)
 1010 MOVE scrx(motif+12),scry(motif+12)
 1020 DRAW scrx(motif+24),scry(motif+24)
 1030 NEXT
 1040 ENDPROC
 1050 DEF PROCinitviewtransform(rho,theta
,phi)
 1060 LOCAL sintheta,costheta,sinphi,cosp
hi
 1070 sintheta=SIN(RAD(theta))
 1080 costheta=COS(RAD(theta))
 1090 sinphi=SIN(RAD(phi))
 1100 cosphi=COS(RAD(phi))
 1110 va=-sintheta:vb=costheta
 1120 ve=-costheta*cosphi
 1130 vf=-sintheta*cosphi
 1140 vg=sinphi
 1150 vi=-costheta*sinphi
 1160 vj=-sintheta*sinphi
 1170 vk=-cosphi:vl=rho
 1180 ENDPROC
 1190 DEF PROCviewtransform(x,y,z)
 1200 xe=va*x+vb*y
 1210 ye=ve*x+vf*y+vg*z
 1220 ze=vi*x+vj*y+vk*z+vl
 1230 ENDPROC
 1240 DEF PROCperspecttransform(xe,ye,ze,
d)
 1250 xs=d*xe/ze
 1260 ys=d*ye/ze
 1270 ENDPROC
```

*If you would like to know more about graphical techniques for the BBC micro (B/B+) and Electron, why not send off for the book and software which illustrate this series of articles? See page 86 for details.*

***All the major listings for this issue, as printed on the yellow pages, are reproduced in bar code format in our booklet. Turn to page 99 for details.***

# YELLOW PAGES

## GRAPHICS

See Into the Third Dimension, page 82

**Listing 5. Wraps 2D characters around a 3D cylinder**

```
   10 REM Listing 5
   20 REM by Jim McGregor and Alan Watt
   30 REM BBC B/B+/128k and Electron
   40 REM (c) Acorn User January 1986
   50 :
   60 MODE 0:VDU 29,640;512;
   70 PROCinitviewtransform(2000,0,105)
   80 r=600:scrdist=1000:gridsize=600
   90 PROCdrawgrid
  100 FOR y=-gridsize TO gridsize-200 ST
EP 200
  110 PROCword(-gridsize+150,y)
  120 NEXT y
  130 k=GET:MODE 7:END
  140 :
  150 DEF PROCdrawgrid
  160 FOR x=-gridsize TO gridsize STEP 1
00
  170 PROCscreen(x,-gridsize)
  180 MOVE xs,ys
  190 FOR y=-gridsize+100 TO gridsize ST
EP 100
  200 PROCscreen(x,y):PLOT 21,xs,ys
  210 NEXT:NEXT
  220 FOR y=-gridsize TO gridsize STEP 1
00
  230 PROCscreen(-gridsize,y)
  240 MOVE xs,ys
  250 FOR x=-gridsize TO gridsize STEP 1
00
  260 PROCscreen(x,y):PLOT 21,xs,ys
  270 NEXT:NEXT
  280 ENDPROC
  290 DEF PROCword(x,y)
  300 RESTORE
  310 READ letters
  320 FOR lett=1 TO letters
  330 PROCscreen(x,y):MOVE xs,ys
  340 READ points
  350 FOR p=1 TO points
  360 READ op,rx,ry
  370 REM coordinates in caption DATA ar
e relative.
  380 x=x+rx:y=y+ry
  390 PROCscreen(x,y)
  400 PLOT op+4,xs,ys
  410 NEXT p
  420 x=x+200
  430 NEXT lett
  440 ENDPROC
  450 DEF PROCscreen(x,y)
  460 LOCAL xw,yw,zw,xe,ye,ze
  470 PROCcylinder(x,y,r)
  480 PROCviewtransform(xw,yw,zw)
  490 PROCperspecttransform(xe,ye,ze,scr
dist)
  500 ENDPROC
  510 DEF PROCcylinder(x,y,r)
  520 LOCAL theta,phi,projr
  530 theta=x/r
  540 zw=y
  550 xw=r*COStheta:yw=r*SINtheta
  560 ENDPROC
  570 DEF PROCinitialise
  580 LOCAL v,vertexno,surfaceno
  590 READ verts
  600 FOR v=1 TO verts
  610 READ vertex(1,v),vertex(2,v),verte
x(3,v)
```

Continued ▶

◀ Continued

```
  620 NEXT v
  630 READ surfs
  640 FOR surfaceno=1 TO surfs
  650 READ noofvertices(surfaceno)
  660 FOR vertexno=1 TO noofvertices(sur
faceno)
  670 READ surface(surfaceno, vertexno)
  680 NEXT vertexno
  690 NEXT surfaceno
  700 ENDPROC
  710 :
  720 DATA 5
  730 REM "I"
  740 DATA 12
  750 DATA 1,0,16, 1,32,0, 1,0,96
  760 DATA 1,-32,0, 1,0,16, 1,80,0
  770 DATA 1,0,-16, 1,-32,0, 1,0,-96
  780 DATA 1,32,0, 1,0,-16, 1,-80,0
  790 REM "M"
  800 DATA 10
  810 DATA 1,0,128, 1,40,-44, 1,40,44
  820 DATA 1,0,-128, 1,-16,0, 1,0,84
  830 DATA 1,-24,-24, 1,-24,24
  840 DATA 1,0,-84, 1,-16,0
  850 REM "A"
  860 DATA 13
  870 DATA 1,32,128, 1,16,0, 1,32,-128
  880 DATA 1,-16,0, 1,-12,44, 1,-24,0
  890 DATA 1,-12,-44, 1,-16,0, 0,32,60
  900 DATA 1,16,0, 1,-8,36, 1,-8,-36
  910 DATA 0,-32,-60
  920 REM "G"
  930 DATA 24
  940 DATA 0,0,20, 1,0,88, 1,20,20
  950 DATA 1,40,0, 1,20,-20, 1,0,-16
  960 DATA 1,-16,0, 1,0,12, 1,-12,8
  970 DATA 1,-24,0, 1,-12,-8, 1,0,-76
  980 DATA 1,12,-12, 1,24,0, 1,12,8
  990 DATA 1,0,24, 1,-16,0, 1,0,16
 1000 DATA 1,32,0, 1,0,-48, 1,-20,-16
 1010 DATA 1,-40,0, 1,-20,20, 0,0,-20
 1020 REM "E"
 1030 DATA 12
 1040 DATA 1,0,128, 1,80,0, 1,0,-16
 1050 DATA 1,-64,0, 1,0,-40, 1,36,0
 1060 DATA 1,0,-16, 1,-36,0, 1,0,-40
 1070 DATA 1,64,0, 1,0,-16, 1,-80,0
 1080 DATA 5
 1090 DATA 12
 1100 DATA 1,0,16, 81,80,-16, 81,0,16
 1110 DATA 1,-32,0. 1,0,96, 81,-16,-96
 1120 DATA 81,0,96, 1,-32,0, 1,0,16
 1130 DATA 81,80,-16, 81,0,16
 1140 DATA 0,-80,-128
 1150 REM "M"
 1160 DATA 10
 1170 DATA 1,16,0, 81,-16,128
 1180 DATA 81,16,-44, 81,24,0
 1190 DATA 81,0,-24, 81,40,68
 1200 DATA 81,-16,-44, 81,16,-84
 1210 DATA 81,-16,0, 0,-64,0
 1220 REM "A"
 1230 DATA 13
 1240 DATA 1,32,128, 81,-16,-128
 1250 DATA 81,32,128, 1,32,-128
 1260 DATA 81,-16,0, 1,-16,128
 1270 DATA 81,-16,0, 0,0,-68, 1,-4,-16
 1280 DATA 81,24,0, 1,-4,16, 81,-16,0
```

Continued ▶

◀ McGregor & Watt listing 5 continued

```
1290 DATA 0,-32,-60
1300 REM "G"
1310 DATA 23
1320 DATA 0,64,92, 1,16,0, 81,-16,12
1330 DATA 81,16,4, 81,-28,4, 81,8,16
1340 DATA 81,-32,-16, 81,-8,16
1350 DATA 81,-4,-24, 81,-16,4
1360 DATA 81,16,-80
1370 DATA 81,-16,-8, 81,28,-4
1380 DATA 81,-8,-16, 81,32,16
1390 DATA 81,8,-16, 81,4,24, 81,16,-8
1400 DATA 81,-16,32, 81,16,16
1410 DATA 81,-32,-16, 81,0,16
1420 DATA 0,-48,-64
1430 REM "E"
1440 DATA 17
1450 DATA 1,80,0, 81,0,16, 1,-80,0
1460 DATA 81,0,-16, 1,0,128
1470 DATA 81,16,-128, 81,0,128
1480 DATA 1,64,0, 81,0,-16, 1,-64,0
1490 DATA 81,0,16, 0,0,-56, 1,36,0
1500 DATA 81,0,-16, 1,-36,0, 81,0,16
1510 DATA 0,-32,-72
1520 :
1530 DEF PROCinitviewtransform(rho,thet
a,phi)
1540 LOCAL sintheta,costheta,sinphi,cos
phi
1550 sintheta=SIN(RAD(theta))
1560 costheta=COS(RAD(theta))
1570 sinphi=SIN(RAD(phi))
1580 cosphi=COS(RAD(phi))
1590 va=-sintheta:vb=costheta
1600 ve=-costheta*cosphi
1610 vf=-sintheta*cosphi
1620 vg=sinphi
1630 vi=-costheta*sinphi
1640 vj=-sintheta*sinphi
1650 vk=-cosphi:vl=rho
1660 ENDPROC
1670 DEF PROCviewtransform(x,y,z)
1680 xe=va*x+vb*y
1690 ye=ve*x+vf*y+vg*z
1700 ze=vi*x+vj*y+vk*z+vl
1710 ENDPROC
1720 DEF PROCperspecttransform(xe,ye,ze
,d)
1730 xs=d*xe/ze
1740 ys=d*ye/ze
1750 ENDPROC
```

**Listing 6. Sticks a motif on a spherical surface**

```
  1 REM Listing 6
  2 REM by Jim McGregor and Alan Watt
  3 REM BBC B/B+/128k and Electron
  4 REM (c) Acorn User January 1986
  5 :
510 DEF PROCsphere(x,y,r)
520 LOCAL theta,phi,projr
530 theta=x/r:phi=y/r
540 projr=r*COSphi:zw=r*SINphi
550 xw=projr*COStheta:yw=projr*SINtheta
560 ENDPROC
```

**See Brushing up your painting, page 88**

## How to enter Super Painter

Super Painter *is written in Basic so should be easy to enter. Remember that the program uses Peter Sandford's machine-code filling routine, published in the January '85 issue of* Acorn User *so you'll need to have a copy of the fill routine saved on the same disc as* Super Painter. *It should be saved as* "COLFILL".

*If you have an Electron then type in these lines in place of those given in the listing:*

```
510 IF INKEY-40 AND INKEY-1 PROCload
520 IF INKEY-40 PROCsqr
550 IF INKEY-49 PROCcirc
560 IF INKEY-18 CALL colfill,X%,Y%,T%
570 IF INKEY-20 PROCmix
580 IF INKEY-53 PROCellipse
600 IF INKEY-50 PROCprinter
610 IF INKEY-37 K%=5:VDU7
620 IF INKEY-22 K%=85:VDU7
630 IF INKEY-39 K%=21:VDU7
640 IF INKEY-19 PROCair
```

*Having typed in these lines, keys 0-9 will be used instead of function keys f0-f9.*

*If you have a 6502 second processor, switch it off before using* Super Painter. *Screens cannot be saved or loaded with the Tube connected. If you have a B+, switch the shadow screen memory off before running* Super Painter. *Finally, remember to set PAGE to &1500 before loading and running the program by typing:*

*PAGE=&1500 <Return>*

*NEW <Return>*

*IMPORTANT: Using* Super Painter *extensively may produce a 'No room' error so miss out all REM statements and single colon lines.*

**Listing 1. Combines popular colour-filling and painting programs**

```
 10 REM Super Painter
 20 REM by Jon Baldwin
 30 REM BBC B/B+/128k and Electron
 40 REM (c) Acorn User January 1986
 50 :
 60 IF PAGE<>&1500 PRINT"Page must be
set to &1500":END
 70 DIM cst%(1),ast%(1),oscli% 40
 80 colfill=&1200:*LOAD"COLFILL" 1200
 90 *FX 18
100 *FX 11
110 *FX 4,2
120 MODE 1:VDU 23;8202;0;0;0;
130 VDU 19,1,0;0;19,2,0;0;19,3,0;0;
140 PROCmenu
150 VDU 20
```

Continued ▶

◀ **Baldwin listing 1 continued**

```
  160 PROCsetvars
  170 ON ERROR PROCerr
  180 VDU 5
  190 :
  200 REPEAT
  210 IF NOT INKEY(-129) PROCkey
  220 PROCcur
  230 IF L%=0 PROCcheck
  240 UNTIL Z%
  250 PROCms(0,"end")
  260 END
  270 :
  280 DEF PROCsetvars
  290 K%=5:Z%=0
  300 V%=0:H%=0
  310 C%=3:T%=3
  320 X%=640:Y%=512
  330 L%=0:A%=X%:B%=Y%
  340 D%=16:tilt=0
  350 cx=48:cy=48
  360 S%=1:R%=1
  370 VDU 24,0;32;1279;860;
  380 ENDPROC
  390 :
  400 DEF PROCkey
  410 *FX 21
  420 IF INKEY-51 PLOT 69,X%,Y%
  430 IF INKEY-97 VDU7:PLOT 95,X%,Y%
  440 IF INKEY-118 AND INKEY-1 CLG:PROCb
ase
  450 IF INKEY-106 PROCcopys
  460 IF INKEY-90 PROCdumps
  470 IF INKEY-55 L%=NOT L%:PROCdel(30)
  480 IF INKEY-38 PROCms(0,"Rubbing out"
):C%=C% EOR 7
  490 IF INKEY-68 PROCrub
  500 IF INKEY-21 AND INKEY-1 PROCsave
  510 IF INKEY-33 AND INKEY-1 PROCload
  520 IF INKEY-33 PROCsqr
  530 IF INKEY-82 PROCdist
  540 IF INKEY-87 AND INKEY-1 PROCloadna
me
  550 IF INKEY-114 PROCcirc
  560 IF INKEY-116 CALL colfill,X%,Y%,T%
  570 IF INKEY-117 PROCmix
  580 IF INKEY-118 PROCellipse
  590 IF INKEY-83 PROCchng
  600 IF INKEY-115 PROCprinter
  610 IF INKEY-23 K%=5:VDU7
  620 IF INKEY-119 K%=85:VDU7
  630 IF INKEY-120 K%=21:VDU7
  640 IF INKEY-21 PROCair
  650 PROCspeed
  660 IF INKEY-100 V%=NOT(V%)
  670 IF INKEY-85 H%=NOT(H%)
  680 PROCcm
  690 IF INKEY-24 D%=4:VDU7
  700 IF INKEY-88 D%=8:VDU7
  710 IF INKEY-73 D%=16:VDU7
  720 IF INKEY-103 AND cx>0 cx=cx-4
  730 IF INKEY-104 cx=cx+4
  740 IF INKEY-98 AND cy>0 cy=cy-4
  750 IF INKEY-66 cy=cy+4
  760 IF INKEY-102 S%=-1:VDU7
  770 IF INKEY-86 R%=-1:VDU7
  780 *FX 202,32
  790 ENDPROC
  800 :
```

**Continued** ▶

◀ **Continued**

```
  810 DEF PROCcur
  820 GCOL3,3
  830 FOR Q%=1 TO2:*FX19
  840 IF L% MOVE A%,B%:DRAW X%,Y%:GOTO90
0
  850 MOVE X%-12,Y%:DRAW X%+12,Y%:MOVE X
%,Y%-12:DRAW X%,Y%+12
  860 PLOT 69,X%+cx,Y%+cy
  870 PLOT 69,X%+cx,Y%-cy
  880 PLOT 69,X%-cx,Y%-cy
  890 PLOT 69,X%-cx,Y%+cy
  900 IF V% MOVE X%,0:DRAW X%,880
  910 IF H% MOVE 0,Y%:DRAW 1279,Y%
  920 NEXT Q%
  930 GCOL 0,C%
  940 ENDPROC
  950 :
  960 DEF PROCcheck
  970 IF Y%>880 Y%=32
  980 IF Y%<32 Y%=880
  990 IF X%<0 X%=1270
 1000 IF X%>1270 X%=0
 1010 ENDPROC
 1020 :
 1030 DEF PROCsqr
 1040 MOVE X%-cx,Y%-cy:MOVE X%-cx,Y%-cy
 1050 PLOT K%,X%-cx,Y%+cy
 1060 PLOT K%,X%+cx,Y%+cy
 1070 PLOT K%,X%+cx,Y%-cy
 1080 PLOT K%,X%-cx,Y%-cy
 1090 ENDPROC
 1100 :
 1110 DEF PROCmix
 1120 PROCget
 1130 VDU 7
 1140 T%=(X%-4)DIV 90+(Y%-864)DIV 80*14
 1150 IF T%=0 C%=3
 1160 IF T%=4 C%=1
 1170 IF T%=8 C%=2
 1180 IF T%=12 C%=0
 1190 X%=A%:Y%=B%
 1200 ENDPROC
 1210 :
 1220 DEF PROCget
 1230 VDU 26
 1240 REPEAT
 1250 L%=0:PROCspeed:PROCcm:PROCcur
 1260 IF X%>1279 X%=2
 1270 IF X%<0 X%=1279
 1280 IF Y%<880 Y%=880
 1290 IF Y%>1023 Y%=1023
 1300 UNTIL INKEY-1
 1310 VDU 24,0;32;1279;860;
 1320 ENDPROC
 1330 :
 1340 DEF PROCrub
 1350 IF L% GCOL0,C%:MOVE X%,Y%:DRAW A%,
B%
 1360 A%=X%:B%=Y%
 1370 ENDPROC
 1380 :
 1390 DEF PROCcopys
 1400 cst%(0)=X%
 1410 cst%(1)=Y%
 1420 ast%(0)=cx
 1430 ast%(1)=cy
 1440 VDU 7
 1450 ENDPROC
```

**Continued** ▶

◀ Continued

```
1460 :
1470 DEF PROCdumps
1480 LOCALM%,N%,cx,cy
1490 M%=cst%(0)
1500 N%=cst%(1)
1510 cx=ast%(0)
1520 cy=ast%(1)
1530 FOR Q%=-cy TO cy STEP4
1540 FOR J%=-cx TO cx STEP4
1550 IF POINT(X%+(J%*S%),Y%+(Q%*R%))=0
GCOLO,POINT(M%+J%,N%+Q%):PLOT69,X%+(J%*S
%),Y%+(Q%*R%)
1560 NEXT,
1570 S%=1:R%=1
1580 ENDPROC
1590 :
1600 DEF PROCchng
1610 REPEAT
1620 W%=GET
1630 E%=E%+1
1640 IF W%=48 U%=0
1650 IF W%=49 U%=1
1660 IF W%=50 U%=2
1670 IF W%=51 U%=3
1680 VDU 19,U%,E%;0;
1690 UNTIL W%=13
1700 VDU 19,U%,E%-1;0;
1710 ENDPROC
1720 :
1730 DEF PROCcirc
1740 IF (cx<=0)OR(cy<=0) VDU7:ENDPROC
1750 VDU 29,X%;Y%;
1760 ox=cx
1770 MOVE 0,0
1780 FOR oy=0 TO cy STEP4
1790 ey=oy
1800 ex=cx/cy*SQR(cy*cy-ey*ey)
1810 PLOT 4,ox,oy:PLOTK%,ex,ey
1820 PLOT 4,ox,-oy:PLOTK%,ex,-ey
1830 PLOT 4,-ox,oy:PLOTK%,-ex,ey
1840 PLOT 4,-ox,-oy:PLOTK%,-ex,-ey
1850 oy=ey:ox=ex
1860 NEXT oy
1870 VDU 29,0;0;
1880 ENDPROC
1890 :
1900 DEF PROCspeed
1910 IF INKEY-89 D%=D%+4
1920 IF INKEY-24 D%=4:VDU7
1930 IF INKEY-88 D%=8:VDU7
1940 IF INKEY-73 D%=16:VDU7
1950 IF INKEY-57 AND D%>4 D%=D%-4
1960 ENDPROC
1970 :
1980 DEF PROCcm
1990 IF INKEY-58 Y%=Y%+D%
2000 IF INKEY-42 Y%=Y%-D%
2010 IF INKEY-26 X%=X%-D%
2020 IF INKEY-122 X%=X%+D%
2030 ENDPROC
2040 :
2050 DEF PROCsave
2060 *SAVE WF 3C80 7D80
2070 ENDPROC
2080 :
2090 DEF PROCload
2100 *LOAD WF 3C80
2110 ENDPROC
```

Continued ▶

◀ Continued

```
2120 :
2130 DEF PROCmenu
2140 LOCAL X%,Y%
2150 FOR Q%=0 TO 27
2160 X%=16+90*(Q% MOD 14)
2170 Y%=878+72*(Q% DIV 14)
2180 GCOL 0,3
2190 MOVE X%,Y%
2200 PLOT 1,0,60:PLOT1,66,0
2210 PLOT 1,0,-60:PLOT1,-66,0
2220 X%=X%+33:Y%=Y%+30
2230 CALL colfill,X%,Y%,Q%
2240 NEXT
2250 GCOLO,3:MOVE 0,866:DRAW 1270,866
2260 DRAW 1270,1022:DRAW 0,1022
2270 DRAW 0,866
2280 PROCbase
2290 ENDPROC
2300 :
2310 DEF PROCellipse
2320 GCOL3,3:F%=FALSE:G%=FALSE:C%=3
2330 PROCms(0,"ELLIPSE")
2340 be=0:end=2*PI
2350 ex=X%:ey=Y%:ecx=cx:ecy=cy:etilt=ti
lt
2360 REPEAT
2370 PROCeldraw(be,end)
2380 ox=X%:oy=Y%:ocx=cx:ocy=cy:otilt=ti
lt
2390 REPEAT
2400 PROCcross
2410 PROCspeed
2420 PROCcm
2430 PROCcheck
2440 IF INKEY-104 cx=cx+4:cy=cy+4
2450 IF INKEY-103 cx=cx-4:cy=cy-4
2460 IF INKEY-66 cy=cy+4
2470 IF INKEY-98 cy=cy-4
2480 IF INKEY-65 tilt=tilt+PI/20
2490 IF INKEY-2 tilt=tilt-PI/20
2500 PROCcross
2510 ox=X%:oy=Y%
2520 ocx=cx:ocy=cy:otilt=tilt
2530 UNTIL(INKEY-74 OR INKEY-99 OR INKE
Y-1)
2540 IF INKEY-1 F%=TRUE
2550 IF INKEY-74 G%=TRUE
2560 PROCeldraw(be,end)
2570 ex=X%:ey=Y%
2580 ecx=cx:ecy=cy:etilt=tilt
2590 UNTIL(F% OR G%)
2600 PROCbase
2610 IF G% GCOLO,7:PROCeldraw(be,end):E
NDPROC
2620 PROCeldraw(be,end)
2630 st=0
2640 PROCsf:st=ang
2650 REPEAT:PROCsf
2660 UNTIL ang>st:fin=ang
2670 PROCeldraw(be,end)
2680 GCOLO,3
2690 PROCeldraw(st,fin)
2700 ENDPROC
2710 :
2720 DEF PROCeldraw(start,stop)
2730 PROCbegin
2740 FOR ang=start TO stop STEP PI/10
2750 PROCcalc
```

Continued ▶

◀ **Baldwin listing 1 continued**

```
 2760 DRAW x,y
 2770 NEXT
 2780 ENDPROC
 2790 :
 2800 DEF PROCbegin
 2810 sib=SIN(etilt):cob=COS(etilt)
 2820 ang=start
 2830 PROCcalc
 2840 MOVE x,y
 2850 ENDPROC
 2860 :
 2870 DEF PROCcalc
 2880 sia=SIN(ang):coa=COS(ang)
 2890 x=ex+ecx*coa*cob-ecy*sia*sib
 2900 y=ey+ecx*coa*sib+ecy*sia*cob
 2910 ENDPROC
 2920 :
 2930 DEF PROCcross
 2940 MOVE ox-ocx*COS(otilt),oy-ocx*SIN(
otilt)
 2950 DRAW ox+ocx*COS(otilt),oy+ocx*SIN(
otilt)
 2960 MOVE ox-ocy*COS(otilt+PI/2),oy-ocy
*SIN(otilt+PI/2)
 2970 DRAW ox+ocy*COS(otilt+PI/2),oy+ocy
*SIN(otilt+PI/2)
 2980 ENDPROC
 2990 :
 3000 DEF PROCsf
 3010 PROCbegin
 3020 REPEAT
 3030 PROCcalc
 3040 PROCelcur
 3050 IF INKEY-99 ang=ang+PI/10
 3060 IF ang>PI*2+st ang=ang-PI*2
 3070 PROCelcur
 3080 UNTIL INKEY-74
 3090 VDU 7
 3100 ENDPROC
 3110 :
 3120 DEF PROCelcur
 3130 MOVE x-12,y:DRAW x+12,y
 3140 MOVE x,y-12:DRAW x,y+12
 3150 ENDPROC
 3160 :
 3170 DEF PROCerr
 3180 IF ERR=17 Z%=1 ELSE PROCms(1,"CHEC
K DISC : PRESS KEY TO CONTINUE")
 3190 PROCbase
 3200 ENDPROC
 3210 :
 3220 DEF PROCbase
 3230 VDU 26:GCOL0,3
 3240 PLOT 4,0,0:PLOT 4,0,28
 3250 PLOT 87,1270,28
 3260 PLOT 4,1270,0:PLOT 87,0,0
 3270 MOVE 0,28:DRAW 1280,28
 3280 VDU 24,0;28;1270;860;
 3290 GCOL 3,C%
 3300 ENDPROC
 3310 :
 3320 DEF PROCms(W%,mes$)
 3330 VDU 26:MOVE 5,24
 3340 PRINT;mes$
 3350 VDU 24,0;32;1279;860;
 3360 IF W% THEN REPEAT UNTIL GET
 3370 ENDPROC
 3380 :
```

Continued ▶

◀ Continued

```
 3390 DEF PROCdel(de)
 3400 TIME=0:REPEAT UNTIL TIME=de
 3410 ENDPROC
 3420 :
 3430 DEF PROCair
 3440 FOR i%=Y%-cy TO Y%+cy STEP D%
 3450 FOR j%=X%-cx TO X%+cx STEP D%
 3460 IF RND(10)<5 PLOT 69,j%,i%
 3470 NEXT,:ENDPROC
 3480 :
 3490 DEF PROCdist
 3500 IF NOT INKEY-1 A%=X%:B%=Y%:ENDPROC
 3510 PROCsavename
 3520 ENDPROC
 3530 :
 3540 DEF FNinpname
 3550 REPEAT
 3560 PROCclearbase
 3570 VDU 26
 3580 MOVE 5,24
 3590 INPUT"Filename : "file$
 3600 UNTIL LEN(file$)>0 AND LEN(file$)<
8
 3610 PROCclearbase
 3620 VDU 24,0;32;1279;860;
 3630 =file$
 3640 :
 3650 DEF PROCclearbase
 3660 VDU 24,0;0;1279;24;
 3670 GCOL 0,128:CLG
 3680 VDU 24,0;32;1279;860;
 3690 ENDPROC
 3700 :
 3710 DEF PROCsavename
 3720 PROCoscli("SAVE "+FNinpname+" 3C80
7D80")
 3730 ENDPROC
 3740 DEF PROCloadname
 3750 PROCoscli("LOAD "+FNinpname+" 3C80
")
 3760 ENDPROC
 3770 :
 3780 DEF PROCoscli($oscli%)
 3790 LOCAL X%,Y%
 3800 X%=oscli%:Y%=oscli% DIV 256
 3810 CALL &FFF7:ENDPROC
 3820 :
 3830 DEF PROCprinter
 3840 REM Here is a screen dump for
 3850 REM Epson type printers. Insert
 3860 REM your own routine if necessary
 3870 :
 3880 MOVE0,0:VDU 29,0;0;2,1,27,1,65,1,8
,1,10
 3890 FORy%=860TO32STEP-16
 3900 VDU 1,27,1,76,1,192,1,3
 3910 FOR x%=0 TO 1276 STEP4:A%=0:B%=0
 3920 FOR z%=0 TO 12 STEP4
 3930 A%=A%*4+3*POINT(x%,y%-z%)
 3940 B%=B%*4+3*POINT(x%+2,y%-z%)
 3950 NEXT:VDU1,A%,1,A%,1,B%:NEXT
 3960 VDU 1,10:NEXT:VDU 1,27,1,64,3
 3970 ENDPROC
```

# USERRAM

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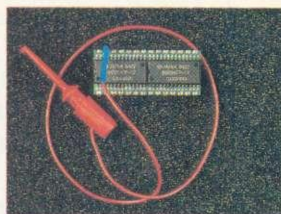
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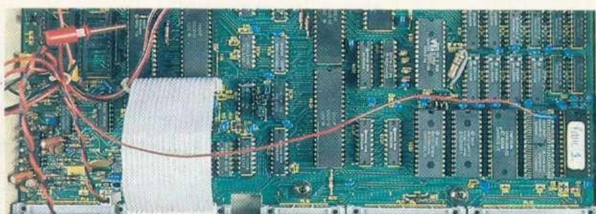
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# BEEB FORUM

**The differences between the BBC micro models B and B+ are looked at – some light is also thrown on the workings of the shadow screen**

*Ian Copestake*

## LIFE AFTER THE MODEL B

The main purpose of this article is to highlight differences between the model B and model B+ from a programmer's point of view. Some of the changes are buried rather deeply in the new User Guide, others are not mentioned there at all. These notes also throw some light on the workings of the shadow screen.

The article does not cover differences between Basic 1 and Basic 2, which are dealt with in chapter 49 of the User Guide.

### Flags and variables referred to in the article

● **Shadow screen actually selected flag (SSAF)** – this is kept in bit 4 of location &00D0, which is the VDU status byte. It can be read using OSBYTE &75. The operating system writes it whenever MODE or VDU22 is executed, setting it to 1 if a shadow mode is being selected. It is read during OSBYTE &84.

Note that *SHADOW or OSBYTE &72 will not change this flag, and it is not used by Basic in setting HIMEM.

● **Shadow screen provisionally selected flag (SSPF)** – this flag is kept at location &027F, and can be read or written using OSBYTE &EF. Its value is 1 at switch-on or after a hard Break, meaning that the shadow screen is provisionally deselected. The value will be changed to the parameter following *SHADOW or to the value of X in OSBYTE &72, and is retained through a soft Break.

The purpose of SSPF is to decide the meaning of 'MODE n' or 'VDU22,n' when n is less than &80.

● **Shadow screen select latch** – this latch is at bit 7 of SHEILA location &FE34. It is reset to zero during initialisation and updated whenever MODE or VDU22 is executed, taking the same value as SSAF.

● **Current screen mode (CSM)** – this variable is stored at location &0355, and only takes values in the range 0 to 7. It can be read using OSBYTE &87 (result in Y), or OSBYTE &A0 with X=&55 (result in X).

### Screen mode selection

The code to perform 'VDU22,n' is at &CAEE in the model B+, and is worth studying in order to make sense of chapter 42 in the new User Guide. This how it starts.

● **&CAEE** – A=(&0323), reading the specified mode number from the VDU queue. Y=A. If the mode number is more than 127, branch to &CB01. Else if SSPF=0 (ie, the shadow screen is provisionally selected), branch to &CB01. Otherwise call &C5A1 with A=&EF, which resets SSAF to zero; then jump to &CB07 with Carry clear.

● **&CB01** – Call &C596 with A=&10, which sets SSAF to 1. Set Carry.

● **&CB07** – Rotate Carry into bit 7 of (&FE34), effectively copying the new value of SSAF into the shadow screen select latch. Y=A, restoring the specified mode number, and the rest of the mode setting follows.

'MODE n' in Basic updates HIMEM and the Basic stack pointer using OSBYTE &85, then performs 'VDU22,n' as above.

The above code, together with the notes on OSBTYE &72 and &85 below, should make it very clear why the examples in chapter 42 work as they do.

### Notes on OSBYTE calls

● **OSBYTE &00 (0) – read operating system version number.** When called with X<>0, this returns with X=2 on the B+.

● **OSBYTE &02 (2) – select input device.** On page 408 of the new User Guide 'X=3' should read 'X=2'.

● **OSBYTE &72 (114) – control shadow screen provisional selection.** The code for this new call (equivalent to *SHADOW) starts at &E910, and simply makes SSPF equal to X (or the parameter following *SHADOW). Nothing else changes. The previous value of SSPF is returned in X, and Y will contain the contents of location &0280 (which is not used by the operating system as far as I know).

● **OSBYTE &73,&74 (115,116).** OSBYTE processing has been rearranged slightly in OS 2.00 so that the numbers &72 to &A0 form one group. At present, the numbers &73 and &74 just do nothing: they are not offered to paged ROMs, and using them in *FX form does not produce a 'Bad command' error.

● **OSBYTE &75 (117) – read VDU status byte.** On return, bit 4 of X will equal SSAF.

● **OSBYTE &76 (118) – read CTRL/Shift key status.** The Advanced User Guide describes this call as 'Reflect keyboard status in keyboard LEDs'. In fact the two tasks are closely interwoven in the operating system.

The code starts at &E9EC and is not easy to follow, but there seems to be a faulty jump after the CTRL key is checked at &EF1E. The Carry flag is set on exit if CTRL is pressed, but the Shift pressed information has been lost – although it might briefly remain in bit 7 of location &FA.

● **OSBYTE &83 (131) – read OSHWM.** On my machine, fitted with the 1770 DFS version 2.0j, this call returns &1900 at switch-on. Rumour has it that later versions of the B+ will use the shadow RAM above &8000 as DFS workspace, so OSHWM and PAGE may revert to &0E00.

● **OSBYTE &84 (132) – read top of free RAM for current mode.** This works as follows on the B+: If SSAF=0, return with X=0, Y= high byte of start address for mode [CSM AND 7]. Else return with X=0, Y=&80.

Note that the value of SSPF has no effect on the result.

● **OSBYTE &85 (133) – read top of free RAM for mode X.** This works as follows on the B+: If X>=&80 or if SSPF=0, return with X=0, Y=&80. Else return with X=0, Y= high byte of start address for mode [X AND 7].

Note that if SSPF=0, the result will be &8000, whatever mode is specified.

● **OSBYTE &8E (142) – select language ROM.** The numbering of the sideways ROM sockets is explained under this heading, on page 407 of the User Guide. Their location is shown in Appendix G.

● **OSBYTE &90 (144) – TV.** The last sentence of page 419 should read 'Interlace is on on power up.' (This is an addendum to the errata sheet!)

● **OSBYTE &98 (152) – examine specified buffer.** Acorn has always claimed that this call would return the next character to be read

in the Y register, but this was not true for OS 1.20. The bug was caused by a branch at &E474 which went one byte too far.

The branch, now at &DE67, has been corrected in OS 2.00. The call now works as specified, but any software written using the 'LDA (&FA), Y' patch suggested in the Advanced User Guide will not run correctly on the B+.

● **OSBYTE &B3,&B4 (179,180) – read/write primary/current OSHWM.** When reading, these calls initially return the same value as OSBYTE &83. If a 6502 second processor is connected, OSBYTE &B4 (unlike OSBYTE &83) returns the value of OSHWM in the I/O processor: this is &1F00 with the 1770 DFS.

● **OSBYTE &E0 (224) – read/write effect of input buffer characters &F0 to &FF.** The new and old User Guides claim that this call cancels the VDU queue. However, the call accesses location &0270, which read by code at &DF16 (part of OSRDCH) and controls the effect of buffer characters &F0 to &FF.

The VDU routines starting at &C4B7 handle codes requiring more than one byte by (in effect) counting down to zero from the number of bytes expected, which is found from a table when the original control code arrives, rather than by counting up the number of bytes received. It is thus possible to abandon a control code sequence half-way through by zeroing the counter, but the count cannot be started again without reinstating the 'bytes expected' value. Putting zero at &0270 is not likely to achieve this.

The countdown takes place in location &026A, which can be read or written using OSBYTE &DA (218).

● **OSBYTE &EF (239) – read/write SSPF.** This call is similar to OSBYTE &72, but also provides reading SSPF without altering it. As noted earlier, it will not immediately affect the value of SSAF, CSM or HIMEM.

● **OSBYTE &FE (254) – read/write available RAM.** This call accesses location &028E. OS 2.00 puts the value 1 here during initialisation, but I have found no other references to it. Putting &80 here will not turn your machine back into a model B!

## Shadow RAM and split paging

First I'll explain what shadow RAM is. I mean the area of sideways RAM above the screen display, ie, &8000 to &AFFF. It can be selected by setting bit 7 of the paged ROM select register at &FE30 and its copy at &00F4. OSBYTE &97 should be used to write to &FE30 if the Tube is involved.

Once you've selected shadow RAM, it can be read and written in the normal way. This cannot be done from Basic, which requires the paged ROM select register to contain its socket number.

Split paging means selecting the shadow RAM and a 16k sideways ROM or EPROM at the same time. This can be done by adding 128 to the ROM socket number, to set the top bit, before placing the number in the select register or an extended vector. Any ROM code in the top 4k, from &B000 to &BFFF, can then access the shadow RAM directly. The ROM can sill have a header at &8000, since shadow RAM will not be selected when service calls are issued. The ROM can select shadow RAM itself when responding to a * command.

The current DFS cannot load or save shadow RAM because it keeps its own socket number in the paged ROM select register. The cassette filing system might be able to, however, if entered with shadow RAM selected. Would someone like to try this?

## OSWRSC and OSRDSC

These new operating system calls are described in chapter 45 of the new User Guide, and listing 1 shows how to use them.

OSWRSC can be used to write to any address below &8000 (not just the screen), and will automtically write to the shadow screen if it is actually selected. It will write to the shadow RAM at &8000 to &AFFF if the paged ROM select register contains a value of &80 or more. This is not possible from Basic, of course, but it does suggest a way in which a machine code program could treat all the memory from the start of current screen RAM to &AFFF as one continuous area.

OSRDSC reads in a similar way, but it can also access memory from &8000 upwards from Basic (including memory from &C000 on). As well as reading sideways ROMs, OSRDSC can read from the shadow RAM if Y is more than 127 on entry. In this respect it offers an alternative to the rather cumbersome OSWORD &05.

Neither OSWRSC nor OSRDSC can be called in my 6502 second processor – a 'Bad error' is produced. Later versions of the second processor operating system could very possibly be different.

## OSWORD &05 and &06

The advantage of these calls is that they can be used from Basic and from the second processor. Listing 1 gives some examples.

The routines start at &E7FD and &E781 respectively. They check specifically to see whether the two most significant bytes of the address in the parameter block are equal to &FFFE. If they are, the paged ROM select register is set to &80 while the address is read or written. This allows the calls to read or write the shadow RAM (but not the shadow screen) if the address is in the range of &8000 to &AFFF.

I hope these notes will be helpful, and welcome letters from readers who have looked into other differences between the B+ and the earlier BBC micros.

## Notes on listing 1

The listing includes some standard procedures which could be used in any program.

PROCoswrsc performs a call to OSWRSC, writing the specified byte to location [address + offset]. The offset must be less than 256.

FNosrdsc performs a call to OSRDSC, returning the byte read. The value of socket is irrelevant if the address is below &8000; otherwise it will read from a sideways ROM (socket < 128) or the shadow RAM (socket >= 128). 'AND &FF' masks off everything except the value we want, which is in the accumulator.

FNosword5 and PROCosword6 read and write the specified address, using a 5-byte parameter block at &0070. (Notice how this parameter block can be LOCALised like any other variable, in case it is being used for something else by another part of the program.) These routines can read or write the shadow RAM if the address is specified as, for example, &FFFE8000; FNreadshadowram2 and PROCwriteshadowram do this automatically for you.

FNreadshadowram1 reads the shadow RAM by the alternative method, using OSRDSC.

The remainder of listing 1 contains a simple demonstration. A message is stored in shadow RAM, then retrieved using both methods, and finally displayed on the screen. One retrieval method accounts for each half of the double-height text.

This process is repeated with slight changes to the message, giving you some idea of the speed achieved (or lack of it).

Pressing a key alternates between non-shadow and shadow screen modes. So long as no key is pressed [NOT INKEY 0] = [NOT -1] = 0; any keypress will produce a non-zero result.

*See page 124 for Ian Copestake's listing*

*If you have any queries, good ideas or advice, here's how to show your originality and win some cash. Write to Beeb Forum,* Acorn User, *68 Long Acre, London WC2E 9JH.*

**Listing 1. How to use the new operating system calls, OSWRSC and OSRDSC**

```
10 REM Using the B+
20 REM by Ian Copestake
30 REM for BBC B+ only
40 REM (c) Acorn User January 1986
50 :
60 DIM test 30
70 FOR mode =7 TO 135 STEP 128
80 MODE mode
90 PRINT"This is Mode ";mode
100 :
110 REM Put a string into shadow RAM
120 REPEAT
130 $test = CHR$141 + CHR$(RND(8)+128) + "PRESS A KEY TO CONTINUE"
140 test?RND(LEN$test-1)=42
150 FOR offset =0 TO LEN $test
160 PROCwriteshadowram (test?offset,&8000+offset)
170 NEXT offset
180 :
190 REM Now read it back in two ways
200 REM and put it into screen RAM
210 :
220 address=&7DE6
230 FOR offset =0 TO LEN $test
240 PROCoswrsc (FNreadshadowram1(&8000+offset),address,offset)
250 PROCoswrsc (FNreadshadowram2(&8000+offset),address,offset+40)
260 NEXT offset
270 UNTIL NOT INKEY 0
280 NEXT mode
290 RUN
300 :
310 DEF PROCoswrsc (byte,address,offset)
320 LOCAL A%,Y%
330 A%=byte
340 ?&D6=address
350 ?&D7=address /&100
360 Y%=offset
370 CALL &FFB3
380 ENDPROC
390 :
400 DEF FNosrdsc (address,socket)
410 LOCAL Y%
420 ?&F6=address
430 ?&F7=address /&100
440 Y%=socket
450 =USR &FFB9 AND &FF
460 :
470 DEF FNosword5 (address)
480 LOCAL A%,X%,Y%,!&70,?&74
490 A%=5
500 X%=&70
510 Y%=0
520 !&70=address
530 CALL &FFF1
540 =?&74
550 :
560 DEF PROCosword6 (byte,address)
570 LOCAL A%,X%,Y%,!&70,?&74
580 A%=6
590 X%=&70
600 Y%=0
610 !&70=address
620 ?&74=byte
630 CALL &FFF1
640 ENDPROC
650 :
660 DEF FNreadshadowram1 (address)
670 =FNosrdsc (address,&80)
680 :
690 DEF FNreadshadowram2 (address)
700 =FNosword5 (address +&FFFE0000)
710 :
720 DEF PROCwriteshadowram (byte,address)
730 PROCosword6 (byte,address +&FFFE0000):ENDPROC
```

# ATOM FORUM

**How to co-ordinate Atom expansion ideas so that hardware advances can be consistent**

***Mike Barwise***

## EXPANSION OVERVIEW

Home micro expansion can be approached by the industry in two different ways: the marketing of machine specific or dedicated 'sealed box' add-ons which can be plugged in and put into action by the non-technical user, or the provision of reliable interfacing to allow the informed user to develop their own hardware systems, applicable to whatever micro they happen to be using. Both ways have their pros and cons.

In the atmosphere of machine level semi-literacy which has until now predominated, the provision of add-ons guarantees substantially greater sales potential. The production of affordable sophisticated hardware depends greatly on volume sales, so we must thank this approach for what are in essence quite unrealistically low hardware prices.

The major problems are, however, forced obsolescence and the difficulty of adaptation to special applications. Once a given micro has been superseded by another model, very few manufacturers generally continue support.

'Informed user' expansion inevitably demands a greater degree of application and determination on the part of the micro user, but, whatever you think, the principles of micro technology are really very simple indeed to master. The myth that machine level concepts are difficult to grasp has, I fear, been intentionally cultivated to the advantage of the micro industry.

As far as the Atom is concerned, the 'sealed box' is dead anyway. Five years after its inception, the Atom has been superseded twice by its inventors alone. But . . . the big BUT! this does not mean that it no longer functions. It just means that to perform the more advanced and complex operations ingenuity will have to substitute for the cheque book.

The following notes are an overview of the expansion envisaged at Bear Hardware for the Atom. I must stress that this is only one of many alternatives, but it is obviously a good idea to use some consistent plan so that advances and developments can be co-ordinated. Equally important, although the details of these notes are specific to the Atom, the principles are universal to 8-bit micros using the 6500 series processors, and also applicable with limited reservations to micros using other 8-bit non-multiplexed CPUs.

### Starting points

The first job when attempting expansion is to define the pinout and mapping of the expansion port(s) on the micro. The Atom is very free here, as practically half the address map is unused and/or freely available via a set of buffers. On the other hand, the BBC micro has two adjacent user areas, each 256 bytes wide, available between &FC00 and &FDFF via buffers, and some other more specialised ports which we will not consider for the moment.

Within the free or 'user' areas, there may be addresses or address blocks allocated to specific purposes by the micro's designers, for example, the 8271 FDC hardware space (128 bytes at &0A00) on the Atom. These should each be considered in turn in terms of their applicability. If you contemplate using the recommended hardware at a later date, cross the address block off your list of free space. Non-standard uses of such spaces will probably lead to software contention later, so be careful. The resulting list will show you how much expansion is theoretically possible.

Table 1 is an address map of the Atom in its original form, showing the dedicated and free areas. 'Internal' means the chips are inside the Atom case, and 'external' means that these spaces can be used via the bus connector. Not all internal spaces are available for use. Note that the map is 64k bytes in length. There is no way of directly extending it beyond this, as the 6502 CPU only controls 16 address lines (2 to the power of 16 is 65536 in decimal or 64k). It is therefore pointless to implement a fully populated 64k RAM board on a 6502-based micro, as two different things (RAM and ROM, RAM and hardware, etc) cannot simultaneously occupy the same space.

### The Atom map

The topmost 16k of the Atom map is occupied by ROM containing the software for the executive, disc file handling and languages (Basic and assembler), which leaves 48k.

The 'lower text space' can easily be extended between &2000 and &7FFF, which is 24k RAM. The best approach is to remove IC6, thereby converting the area between &2800 and &3BFF to 'external'. All the memory (three 8k static RAM chips) can then be put on the bus, and the ten 2114 chips removed from sockets IC10-19. This will reduce power consumption, and also reduce bus loading, which

| Address | Used for | Position |
|---|---|---|
| FFFF hex | | |
| | ROM mainly OS | internal |
| F000 hex | | |
| | DOS ROM | external |
| E000 hex | | |
| | Floating Point ROM | internal |
| D000 hex | | |
| | ROM Basic etc | internal |
| C000 hex | | |
| | Empty | internal |
| BC00 hex | | |
| | VIA/printer | internal |
| B800 hex | | |
| | Empty | internal |
| B400 hex | | |
| | PIA/keyboard/ cassette | internal |
| B000 hex | | |
| | Option ROM | internal |
| A000 hex | | |
| | Empty | internal |
| 9800 hex | | |
| | Video RAM | internal |
| 8000 hex | | |
| | Free space (RAM etc) | external |
| 3C00 hex | | |
| | 'Lower text space' RAM | internal |
| 2800 hex | | |
| | Disc buffer RAM | external |
| 2000 hex | | |
| | Free space (peripherals etc) | external |
| 0400 hex | | |
| | Zero k RAM | internal |
| 0000 hex | | |

**Table 1. An address map of an 'original' Atom**

is too near the limit for real safety on a 12k Atom. See the August '85 Atom Forum for notes on bus loading, which is the main problem facing the Atom expansion enthusiast. The 'plumbing' approach (just adding more and more chips) works on paper, but is frequently not reliable in practice.

The top of the 24k RAM impinges on the minimum VDU memory (512 bytes from &8000). Above this is the graphics memory to &97FF. Various approaches have been offered in the past to fill the wasted 2k above the VDU memory (&9800 to &9FFF) with RAM, but these have usually involved soldering chips to each other.

This is *always* bad for reliability! A definitive solution using a single 8k RAM chip will be presented soon on these pages.

However this space is filled, it takes you to &A000. This is defined as the 'utility ROM' space, and is where all the current Atom ROM software is plugged in. Sideways ROM boards can be used to switch between ROMs in this 4k space, but you must watch out for contention due to carelessly written software.

| | B | A |
|---|---|---|
| 1 | +5V | +5V |
| 2 | +12V | A15 |
| 3 | −12V | A14 |
| 4 | −5V | NWDS |
| 5 | +15V | NRDS |
| 6 | −15V | NRST |
| 7 | | A8 |
| 8 | | A7 |
| 9 | | A6 |
| 10 | | A5 |
| 11 | | A4 |
| 12 | | A3 |
| 13 | | A2 |
| 14 | | A1 |
| 15 | | A0 |
| 16 | | D7 |
| 17 | | D6 |
| 18 | | D5 |
| 19 | | D4 |
| 20 | | D3 |
| 21 | | D2 |
| 22 | | D1 |
| 23 | | D0 |
| 24 | | A13 |
| 25 | RDY | A12 |
| 26 | SO | A11 |
| 27 | (RDY) | A10 |
| 28 | IRQ | A9 |
| 29 | NMI | ph2 |
| 30 | SYNC | R/NW |
| 31 | | I/O (BLK) |
| 32 | GND | GND |

**Table 2. A bus pinout specification of the Acorn bus**

A really good idea is to install RAM in this space along with the 2k at &9800. This results in 6k instead of 4k being available for utilities and applications, and is most useful with a disc system. All new &A000 software from BEARsoft will be available on disc for use with &A000 RAM, and some of the more advanced disc-based items will demand RAM here.

The VIA and PIA (printer, keyboard, cassette and VDU controllers) are very wastefully decoded in the 4k block &B000. They each occupy 1k (PIA – &B000 to &B3FF, VIA – &B800 to &BBFF). This is a pity, as the PIA (Intel 8255) only really uses four bytes, and the VIA (6522) uses 16 bytes. The balance of the 1k in each case is taken up by 'echoes' of the real addresses, due to the only partial decoding of the chip selects. The two 1k areas between them are also lying idle and look as if they could be used for something, but there is an important proviso: you cannot load a file into RAM through the PIA and VIA addresses, or you will corrupt their function. Any data storage that over-runs its dimensions in these areas would do the same. This makes them more suitable for hardware or ROM than for RAM. They are currently not decoded to the expansion bus, and quite extensive hardware modifications would be needed to do this.

We now come to the most controversial expansion data of the Atom: the region of the map between &400 (above the 1k systems RAM) and &1FFF.

The original Acorn peripheral boards were relatively loosely decoded. Similar to the Atom VIA and PIA, they usually took up much more space than they actually needed. The 7k space could accommodate roughly one board per 256 bytes, minus the 1k used for Teletext VDU RAM. This means about 24 boards, which is more than could be used anyway due to electronics constraints. Fifteen boards is a realistic maximum. These boards were distributed throughout the 7k with spaces between, which was very wasteful.

For the sake of efficiency we now depart from the original Acorn concept.

We still have to settle for wasting much of free block zero (&400 to &0FFF). There will inevitably be gaps between the hardware addresses, due to having 3k of space and probably no more than 1k of hardware addresses. Even this assumes some early 'loose' boards. However, 4k of RAM can be placed at &1000. Because 8k RAM chips are so cheap now, the method is to fit an 8k chip and disable the lower half of it using the BLOCK ZERO signal from the bus. This RAM can only really be used as a short self-contained program space or as a data area, because the disc system catalogue buffer starts at &2000, but it will prove useful for people working in assembler and for 'virtual memory' programming, where routines are held on disc and called as needed into a smaller space than would be required for the whole program to be resident.

The resulting Atom has space for as many peripheral boards as can be allowed to load the bus, and 28k of continuous RAM below the VDU memory, of which almost 22k is directly available to Basic without contention with disc or floating point maths. In text mode, there is also a continuous RAM area from &8200 to &AFFF (11.5k).

Table 2 is a bus pinout specification of the Acorn Bus. This is presented (along with the irrelevant VIA ports) on the internal bus connector (PL7) of the Atom, which is different from PL6. This pinout was apparently invented by Acorn for their modular systems 2 through 5, and is still in use by at least three manufacturers in minor variants. The Bear Hardware Subrack Interface conforms to this pinout, and extends the signal path by 1 metre to an expansion backplane where the expansion boards carrying RAM, etc, can be sited. (A backplane is essentially a set of identical sockets wired in parallel.)

My own main Atom is a sample of what can be done: I run an eight slot backplane containing permanent RAM, FDC and EPROM programmer boards, and four slots are used for adding various alternative extras depending on the application. I can fit serial In/Out (RS232), analogue and high power digital switch boards, for example, and also special circuits built on prototyping boards for given applications. The low level driver software for a Eurocard's worth of chips rarely exceeds about 2k of code, so it can be tucked into the extended RAM without much problem.

Please note that a lot of internal Atom upgrades will not work with extensive mapped expansion. Items like the BBC board necessarily conflict with the expansion map, as they were mostly designed as sole upgrades, so inter-compatibility was not considered. There are almost certainly mechanical problems as well, as with a Subrack Interface fitted – the whole of the area to the right of ICs 16 and 17 is occupied. Here you must make your own choice. The list includes the BBC board, the Clare expansion system, various 'piggyback' RAM fillers, and anything that relies on the 'spare' port of the internal VIA.

I hope I have shown here that the Atom need not be thrown in the under-desk filing cabinet just yet. There are many jobs it can do well alongside BBC micros, IBM PCs, or mainframes.

*Write to Atom Forum, Acorn User, 68 Long Acre, London WC2E 9JH*

# ACORN USER




Take a look at numeric keypads: see page 181

# GUIDE TO BUSINESS

# BUSINESS

## NEWS

### Bizznet new on Micronet

Advice on accounting, law, insurance, finance and self-employment are available on Bizznet, a new area on Micronet.

So far 500 pages have been set aside for the service which also runs a job-finder section with Reed Employment. A Watchdog section will look into consumer complaints.

Details from Micronet 800 at 8 Herbal Hill, London EC1R 5EJ.

### Spider alarm

Spider is an alarm system designed to protect equipment such as computers. It's a small box connected by wire to four items. The wire is glued to each and any 'tampering' has the alarm going off as a 98 decibel 'hooter'. Equipment can be used normally when the device is attached. The Spider costs £34.95 (plus post) from Product Innovation, 7 Berners Mews, London W1P 3DG.

### Discs for Gold

Electronic mail users can now access Telecom Gold, Easylink or One-To-One through special discs giving 19 single key commands, 10 send and retrieve commands, and 10 user-definable keys. The disc for each costs £65 plus VAT from LTG Software, 177 Temple Chambers, Temple Ave, London EC4Y 0DT.

### Garland award

Educational software house Garland Computing has been voted the most efficient small firm in the South-West in a scheme sponsored by BT and the Chamber of Commerce.

Handling of customers' orders and technical enquiries were praised, as well as the level of Garland's export orders.

## Triple X from Torch

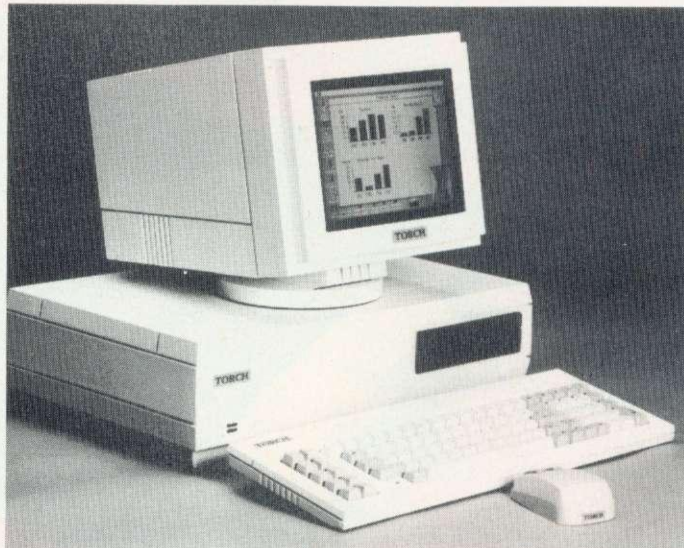
Torch has launched a series of computers called Triple X which run the Unix operating system, and start at £3995.

The machines mark a new phase of the company's products as they are not built around the BBC micro's main circuit board. Torch claims that earlier computers such as the Unicorn are compatible and can be used across a network as terminals to Triple X.

A special operating system has been written to interface the Unix V operating system with windows and icons as in the Apple Macintosh.

The standard micro is run by the 68010 processor and comes with 1Mb of user memory, 20Mb Winchester hard disc and a 720k floppy. Interfaces include the Ethernet local network and X25, to provide access to British Telecom lines. About the only remainder of BBC days, said a company spokesman, was the inclusion of the 1MHz interface.

The chairman of Torch, Patrick Pakenham-Walsh, said he expected the machine to follow earlier BBC-based products into industry, government and universities and to be used commmercially.



**The Torch Triple X: expected to follow earlier BBC-based products into industry**

## Quest help for businesses

The end of the 'book-keeping' and VAT nightmare' is in sight according to Quest with the *Cash Trader* package, now on the BBC and Torch micros.

*Cash Trader* is aimed at small, cash-based businesses with little knowledge of accounting, taxation or computers. It is a spreadsheet system which allows up to 140 columns, most of which are designated by the user.

Entries are automatically put into date order and payments split from receipts. VAT is also extracted and stored for later reporting.

The software comes as an evaluation pack enabling you to make just 40 entries, and costs £17.20 inclusive. Then, if you like it, access is gained to the full version (on the same disc) for the balance of £97.74. Quest simply gives you an access code which is specific to each disc.

An extra part called *Analyser* will take data from the system for display and analysis. This costs £149.44, including the basic *Cash Trader*. Details from Quest at School Lane, Chandler's Ford, Hampshire SO5 3YY. Tel: (04215) 66321.

### One-to-One guide

One-to-One, the latest competitor for electronic mail to BT Gold, has produced a free booklet which explains in simple terms what electronic mail is and how it works.

As mentioned in Business News last month, One-to-One was launched last year and is not just a smail service: it can also send and receive telex messages.

The free 'plain man's guide' and further information can be obtained from One-to-One, Scorpio House, 102 Sydney Street, London SW3 6NL. Tel: 01-351 2468.



# BUSINESS

## NEWS

### Keytel gives remote control

A BBC micro-based teletext system comes with an external keypad, and it can be accessed from outside a shop window. Called Keytel, it enables customers to switch between pages, even when the shop is shut.

The pad is attached to the window and controls a carousel of mode 7 pages.

Details from Business Information Software Systems, 25 Aintree Close, Hillingdon, Middx.

THE DATA PROTECTION ACT 1984



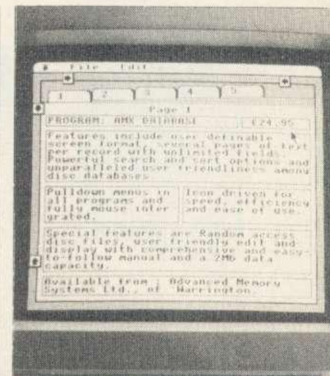

QUESTIONS and ANSWERS on the Act (1-20)

### Data details

Guidelines to the Data Protection Act have been released in the form of 20 questions and answers. Subjects such as electronic mail, schools and clubs are covered.

User groups and other types of clubs will be exempt from registering as long as members are given a clear chance to object to information being kept.

The booklet is free from the Data Protection Registrar, Springfield House, Water Lane, Wilmslow, Cheshire SK9 5AX.




The new AMX Database

### AMX launches new database

A database package has been launched for the AMX Mouse. Called, with some imagination, AMX Database, it has the capability to search and sort on up to 1000 records and each one can have unlimited numbers of fields.

Compatibility with second processors, B+ shadow RAM, Aries boards and ADFS is claimed. See also main news section.

**BUSINESS TOP FIVE**

| | Title | Publisher | Cassette | Disc | ROM | Electron | Shadow on B+ | 6502 | Econet |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Mini Office | Database Publications | £5.95 | £7.95 £9.95⁺ | — | £5.95 | * | * | — |
| 2 | Wordwise Plus | Computer Concepts | — | — | £56.35 | — | — | Yes £4.95 | — |
| 3 | View | Acornsoft | — | — | £59.80 | £29.95 | Yes | Yes | Yes |
| 4 | Viewsheet | Acornsoft | — | — | £59.50 | £29.95 | Yes | Yes | Yes |
| 5 | Wordwise | Computer Concepts | — | — | £56.35 | — | — | — | — |

Compiled by Gallup from a panel of specialist dealers. Contact publisher: Database, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY, 061-480 0171; Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX, (0442) 63933; Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD, (0223) 214411

⁺ 3 inch disc

# BUSINESS

## WHICH WORD TO PROCESS

**In the second article of this series, wordprocessors and how to choose them come under scrutiny**

***Roger Carus***

Having provisionally chosen your hardware (see last month), it is time to look at the software you will need to make the system pay for itself, and this is most likely to come from the use of a wordprocessor. It is almost certain that you will need one, and there is no doubt at all that it should be ROM-based: the problem is which to choose.

It's probably wise to choose from among the three market leaders and these are *Wordwise Plus* (Computer Concepts), the most popular; *View* (Acornsoft) and *Scribe* (Mertec). They all have their strong points. The first two, particularly, have extensive supporting software appearing almost daily. You can read about them and others in past issues of *Acorn User*, notably in Jacquetta Megarry's comparative review (see Review Dates box).

There is little difference in cost between them and they all do most of the jobs you are likely to need. One thing which is often mentioned against wordprocessing on the BBC micro is the limited memory which restricts what can be processed at any one time. However, I really doubt if a limit of 1500 words (in 80-column preview mode) or 4000 words (in 40-column edit mode) in one file is a serious problem. Ask yourself how often you write anything which cannot easily be divided into chapters where the total length is as much as 15-20 pages of a paperback?

There are many minor differences between the wordprocessors which may make them more difficult or easier to use, and only studying the reviews (or better still, discussing your uses with someone who uses one) will help you choose. For example, you may often decide that a page ends with a certain paragraph and the next chapter starts on a new page. To do this with *View* you go through the text using the screen preview option to insert 'page ejects' commands; with *Wordwise Plus* you write a segment program to detect standard 'beginning of paragraph' (easier than it sounds); with *Scribe* the pages are formatted before you start writing (although by using the 'merge' facility this can be changed later) and pressing Shift with function key 2 splits the page at the chosen point.

Many of the initial problems you will be faced with are in the relationship between the wordprocessing system and the printer, because each has its own way of producing effects. The problem of printing '£' signs was mentioned in the last article. Another is deciding where the top of a page will start in relation to the print head, which can be tricky using continuous printing of a lengthy text. Worse still, is filling in forms. Addressing envelopes is easy enough using sheet of labels, but individual envelopes are much better done on a conventional typewriter – and it will also come in handy if you employ a temp when your usual help goes on holiday!

Then what about filing? Depending on your choice of disc drive you will have (at the very least) room for around 16,000 words to be stored on each disc or, say, 100 typical business letters. A disc costs less than £2 – or £6 bearing in mind the need to keep two back-up copies. That is probably less than the cost of typing paper, and they take up much less space.

It's up to you whether to keep paper copies of all correspondence, and the decision will depend on the importance of having them. Carbon copies are not possible when you use continuous stationery (especially if you use a dot matrix printer), although it is possible to get them by using carbon impregnated paper, which is expensive, or by making photocopies. You will need somewhere safe to keep the old copies – if at all possible, away from your workplace in case it burns down! It is probably better to start fresh discs daily or weekly so that you can trace letters, perhaps with a weekly index and a good system of file reference numbers. This is vital if you do not keep paper copies.

At the lowest level, using a wordprocessor allows a 'two-fingered typist' to produce work which the best secretary would be proud of, since the ability to proof-read first on screen and then in draft allows you to get it right. This last point is important, especially when the layout on screen is different from the printed version. You'll still have to go through drafting, alterations and checking the final printed product, as it's easy to print a page of nonsense without being aware of it. It is also essential to make it a routine to save your work to disc at regular intervals – I never like to have more than a few pages of closely-typed material in memory as if anything does go

### SUPPLIERS

**Acornsoft,** c/o Vector Marketing, London Road, Wellingborough, Northants NN8 2RL. *View* from £50, depending on version.

**Beebugsoft,** PO Box 109, High Wycombe, Bucks HP10 8NP. Produce a *Spelling Checker* for *Wordwise* and *View*, £27, and *Wordease*, a *Wordwise Plus* utilities disc, £21.50.

**Computer Concepts,** Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. *Wordwise Plus* £56.35 and a related *Fast Spelling Checker*.

**Mertec** (Merlin Computer Products), 33/36 Singleton Street, Swansea SA1 3QN. *Scribe* £60.55.

**Quorum Technical Services,** Sandford Park Trading Estate, Corpus Street, Cheltenham GL52 6XH. Tel: (0242) 584984. Typesetting from wordprocessed text on BBC discs.

**Systemforms,** Gainsborough House, 10a Gainsborough Road, Woodford Bridge, Essex IG8 8EE. Tel: 01-505 6125. Continuous stationery.

**Watford Electronics,** Jessa House, 250 Lower High Street, Watford, Herts. Tel: (0923) 37774. *ROM-Spell* £26.45, a spelling checker, and *Word-Aid* £13.80, with useful utilities for *Wordwise Plus*.

High Street firms offering photo-lithography services: Kall-Kwik, Prontaprint and many others (see Yellow Pages for local availability).

wrong, you can waste a lot of hard work. When it is safely on disc you can print your draft. If you are using a dot matrix printer you can get very rapid print in draft mode (not using the near letter quality facility) which is quite sufficient for detailed checking.

For much the same reason, it is a good idea to make copies of your disc quite often, and although it seems tedious, the sheer quantity of material which may be on a single disc represents a very large amount at stake if anything goes wrong.

When you reach this stage (and are not making many mistakes) you begin to benefit from the system. First, you'll find that much of the work you do is almost a repeat of previous work, and that you can use standard paragraphs and even letters. The usual example is that of the solicitor preparing the conveyancing of houses who needs to say much the same things in most cases, so that standard paragraphs can be written very carefully and then put into a draft quickly and with no effort, freeing the mental energy for the more exacting editing.

The same techniques allow the business person to keep long documents (containing considerable detail) on record and alter them quickly. Consider what happens to a restaurant menu or price list if VAT is changed or prices go up, and the bad impression it makes to have the old edition with inked alterations for weeks or even months. With a wordprocessor and the disc copy of the old version, a new one can be prepared for temporary use the next day and sent for printing immediately.

This means that instruction manuals can be updated, as most of those in the computer industry often need to be, quickly and accurately. With *Wordwise Plus* there are also facilities to produce an index automatically or to print in two columns. Another facility available for *Wordwise* and *View* is the spelling checker. With a minimum of effort this draws attention to unfamiliar words, including those which are misspelled. While spell-checkers are slow, they are of the greatest help to those who often make mistakes.

It's easy to incorporate tabular data or diagrams in the middle of text from other software which will be described next month. This is done by 'spooling' material for the insert and placing it in a file ready to be printed within the main text.

Included in the *Wordwise Plus* package is a simple form of Mailmerge, which can personalise a file of perhaps 50 (or 500) similar letters and also print the envelopes.

Letters need not only be in English as the characters used in other languages are available: not only the accents of French and Spanish, but also classical Greek and Russian. I have also seen a Hebrew version of *Wordwise* with characteristic right-to-left writing. It is important to remember that these need to use dot matrix, although some daisywheels have special wheels.

Those who need professionally produced brochures and manuals can save themselves time and money by having text which is produced on *Wordwise* or *View* (and probably other programs) used for direct typesetting, without the costly need to re-type the material or to undertake extensive proof reading. This is done by giving the typesetter a printout of the text as you want it to appear, as well as a disc of the text from which the formatting commands have been removed – this can be done by a simple program. Several firms provide this service, including Quorum Technical Services which is doing work for Computer Concepts, Clares Micro Systems and the *Acorn User* Barcode booklets.

An alternative method particularly well-suited to rapid production of text mixed with tabular data (which is notoriously difficult to check), or graphs and diagrams which are expensive to typeset is to produce 'perfect' copies using the wordprocessor and then to use photo-lithography to print them directly from your original. This is a great advantage if the data is very detailed and where precision is of great importance, for example, timetables and rate-cards.

The choice you make is very much a matter of deciding which is best for your own needs, and as usual it is a matter of weighing the balance between cost and quality, and taking into account the extent of your own knowledge and how much time you can afford to devote to the task. Suppose, for example, you want to produce 1000 copies for a mail shot at your clients, and each item is in the form of three sheets of A4 printed on both sides.

The easiest way is to print a single 'perfect' copy of the document and use it as the master for any of the many methods of photocopying, costing around 5p per side or about £300 in all, including the paper. The quality will not be perfect and the pictures will be poor, but it is quick. A more satisfactory quality could be obtained by taking your master to a commercial firm such as one of the many High Street copy bureaus. They will make a cheap printing plate and produce a good result which is collated and ready for use: this method is likely to cost about £50 more, but will save some work. Finally you could send the disc from your wordprocessor to Quorum who can convert it to typesetter format and print it to full professional standards. This is likely to cost around £450 or more (especially if there are pictures needing their own plates), but the product would satisfy anyone.

These ideas are necessarily general since each business is unique and you must always analyse your needs for yourself – or use expensive consultants! Part of the problem lies in the fact that until you are actually using a computer in your work it is difficult to conceive of the ways in which the tool can extend your capability. The starting point, though, is how you use typed and printed materials now.

It is worth remembering that much time spent in business is devoted to communications, especially in the service industries where most small businesses operate, and any time saved by better organisation of the written part of it leaves you more time for the verbal parts which are usually the most critical. As a rule of

### REVIEW DATES

Comparative review of wordprocessors by Jacquetta Megarry, January 1985, pages 143-151

*Wordwise Plus* by Patrick Quick, August 1985, pages 177-179

Special issue on wordprocessors – articles on *Wordwise, Wordwise Plus* and *View* by various authors, September 1985

### USEFUL BOOKS

*Wordwise Plus – a User's Guide* by Bruce Smith, Collins, £9.95. (A hands-on guide to *Wordwise* and *Wordwise Plus*.)

*Wordwise Applications Guide, Using Wordwise Plus* and *Wordwise Plus Programming Ideas,* all by Paul Beverley, Norwich Computer Services, £7 each inclusive of postage from T F R Roberts, Lamorna, The Street, Bunwell, Norfolk NR16 1NA. The programs in them are available on separate discs or tape. (These are invaluable reference books packed with good ideas, including the Greek alphabet and foreign language accents.)

*Wordwise Explained* by Doreen Lowe, Wigantech Publications, £4.95. (Student workbook; similar publications are available for *Edword*, another ROM wordprocessor used mainly for training and *View*.)

*Wordwise* by Kath Butler, Pitman Training Guide series, £2.50. (Training manual for using *Wordwise*; similar guides for *Edword* and *View*.)

*Word Processing on the BBC Micro* by Michael Wood, NCC Publications, £5.25. (Explanation of wordprocessing principles and some training exercises, with useful material on Epson dot matrix printers.)

*SCRIBE

VIEW

WORDWISE

*Scribe* can create documents of up to 255 pages and automatically make back-up copies, but it's greedy on disc space. It has an 80-column display, with text centred on screen. As the printer control program is on disc, *Scribe* documents can be printed out on micros without wordprocessor ROMs.

With *View* 'what you see is what you get' – the layout you create on the screen is what prints out. You can choose (depending on which mode you are using) 40 or 80 column display. It has six markers for block manipulation and a macro facility – a boon for standard letters. Four highlight codes (for example, underline, bold, etc) can be defined. *View* has an editing mode and command mode. When in command mode, you are given information on what program or piece of text you are working on and how many bytes are left.

*Wordwise* has a three-level system of cursor control which gives the option of moving characters, lines or screenfuls of text without taking your eyes off the monitor. It is menu driven, which makes it fairly easy to 'get into', but hitting the wrong option can be fatal.

*Wordwise* allows as many embedded commands as you care to define. It only works in mode 7, therefore only has a 40 column display. However, there is an 80 column preview option. There's a status line at the top of the edit mode screen which gives word count and bytes free. *Wordwise Plus* has a programming language that allows you to write application programs to suit your particular requirements.

```
David Acton Ltd    Software consultancy              Page 1

                                              David Acton Ltd
                                                 68 Long Acre
                                                  London WC2
Mr J Telford
19 Coronation St
Manchester 15

1 November 1985

                 Wordprocessor demonstration

Dear Mr Telford,
This  should  give  you  an idea of what WP can do for you,
with justified text and TABs for this sort of thing:
          Scribe, Wordwise and View are three
          of the most popular wordprocessors
          around.
I hope this is the kind of thing you require.


Yours sincerely,


David Acton







enc.
```

| Commands* | View | Wordwise |
|---|---|---|
| Header | DH | DH |
| Ranged Right | RJ | FI |
| Ranged Left | LJ or Default | Default |
| Centred Text | CE | CE |
| Indented or tabbed text | I or TAB | IN or TI |
| Footer | DF | DF |

**FOOTNOTE In Scribe most commands are carried out using function keys or by answering on-screen questions at the time of printing out*

thumb, each hour a person is employed must bring in £20 in gross profit, so a computer installation costing £2000 and saving half the time spent on written communications will pay for itself in 200 hours. You should expect at least three to four years of life from your purchase, so in other words, if it saves you an hour a week, it is worthwhile.

One problem to be faced is who is going to use the equipment? I have no doubt that anyone who can learn to type with reasonable accuracy can quickly learn to operate, if not necessarily understand, a wordprocessor. My own experience in vocational further education convinces me that this is not a problem, and I am continually amazed at the speed at which people learn. It does, however, call for encouragement of the person who is learning, and they gain from not doing it in isolation. It is not necessary for the manager to learn all the skills but only enough to gain the insight necessary to build on the system.

The next article will explore some other uses which business can make of the equipment.




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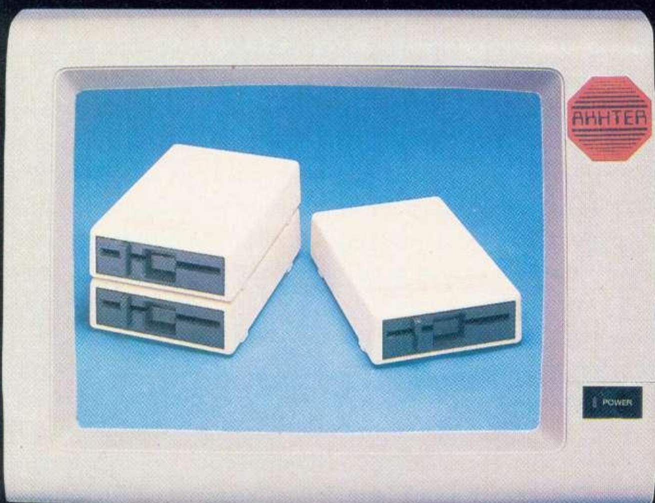

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| **SEIKOSHA BP-5420**, this is a business dot matrix printer. Ideal for Networks. 420 CPS, friction and tractor feed | 1395 | 1605 |
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# DOWN TO BASIC CHOICES

**Edward Brown compares the two versions of Basic supplied with the Z80 second processor in terms of facilities and speed**

This month we are going to have a look at BBC Basic and Mallard Professional Basic, both of which are provided with Acorn's Z80 second processor, and compare them in terms of facilities and speed. This sort of comparison is best explained by tables rather than text and table 1 (opposite) provides a summary and brief comparison of the features available in both versions. The remaining tables and the programs are used to provide benchmark timing information for those who are interested in the relative speeds. In these timings MBasic (which is widely known) is included as a standard CP/M Basic and it's this which Mallard Basic is based on. The two versions of Basic provided with the Z80 second processor are present for different reasons. BBC Basic is there to provide upward compatibility from the straight BBC micro while Mallard Basic has been provided for its compatibility with the industry standard, M-Basic. Both have useful features and annoying omissions but generally speaking each works well.

## BBC Basic

Last year I wrote a review of the Acorn Z80 for the CP/M UG (UK) Newsletter and commented on the compatibility of BBC Basic between the Z80 and the 6502 version. My conclusion then was that a program written in BBC Basic could be taken from a 6502 and run on a Z80 as long as it didn't have any machine code routines in it. This conclusion still holds true a year later and is a tribute to the compatibility of the two versions. The only bugs that have been found have been documented in previous issues of *Acorn User* and the only other problem I have experienced is well documented on page 5 of the *Z80 BBC Basic User Guide*. This was a problem of jumping out of loops which was encountered on a tape-based program that I bought. It was simply resolved by a quick alteration to the program.

The strengths of BBC Basic on the Z80 lie in the fact it is so compatible with the original version on the 6502. This means that it can manipulate the BBC micro in exactly the same way and can therefore use the Beeb to its fullest advantage. In particular, the handling of col-

**TABLE 1. COMPARISON OF MALLARD AND BBC BASIC STATEMENTS**

| Mallard Prof. | BBC Basic | Description |
|---|---|---|
| ABS | ABS | Absolute value |
| ADDKEY | none | Add a new key for an existing record |
| ADDREC | none | Add a new record and key |
| AND | AND | Logical operator |
| ASC | ASC | Get ASCII value of a character |
| ATN | ATN | Arc tangent |
| | | *(BBC Basic also has ACS and ASN)* |
| AUTO | AUTO | Automatic line numbering |
| BUFFERS | none | Set the amount of memory to be used by JETSAM |
| CALL | CALL | Call external subroutine |
| CDBL | none | Convert to double length |
| | | *(BBC Basic has no double precision)* |
| CHAIN | CHAIN | Chain to another program |
| | | *(Mallard can save COMMON data)* |
| CHR$ | CHR$ | Convert to character |
| CINT | none | Convert to integer |
| CLEAR | CLEAR | Clear all variables and files |
| CLOSE | CLOSE# | Close a file or files |
| COMMON | none | Declare common data between programs |
| CONSOLIDATE | none | Mark keyed file as consistent |
| CONT | none | Continue |
| COS | COS | Cosine |
| CREATE | OPENOUT | Create a keyed data file |
| CSNG | none | Convert value to single length |
| CVD | none | Convert string to double length numeric |
| CVI | none | Convert sting to integer |
| CVIK | none | Convert key string to integer |
| CVS | none | Convert string to single length numeric |
| CVUK | none | Convert string to single length integer |
| DATA | DATA | Declare constant data |
| DEC$ | none | Generate formatted string representation |
| DEF FN | DEF | Define function |
| DEF USR | [] | Define external function |
| DEFINT | none | Define integer variable |
| DEFSNG | none | Define single length variable |
| DEFDBL | none | Define double length variable |
| DEFSTR | none | Define string variable |
| DEL | *ERA | Delete a file |
| DELETE | DELETE | Delete lines of program |
| DELKEY | none | Delete a JETSAM key |
| DIM | DIM | Dimension an array |
| DIR | *DIR | Directory listing |
| DISPLAY | *TYPE | Display a file on console |

**Continued ▶**

our and sound is unimpaired, though sometimes a slight delay can occur in the output of complex VDU commands. Use of the *LINE and *CODE statements must be treated with some caution to avoid upsetting the directory buffering and fast Tube copy routines located in the 6502 memory (for details of the memory usage of the 6502 see the June issue).

## Mallard Basic

Although Locomotive Software does not claim that Mallard Basic is MBasic compatible, it is something I believe they could justifiably do. Since receiving the software I have found no MBasic program that is saved in ASCII which will not run. This is probably due to the fact that the original brief to write a Basic interpreter was to write one that would run the Compact software, which also runs under MBasic.

Locomotive produced an interpreter that was not only able to run MBasic programs but which contained more facilities and was faster (see the benchmark timings below), and to this they assigned the title of Mallard.

The speed of Mallard Basic is one of the notable features of the interpreter: the other very notable feature is its extended file handling capabilities. These extended features are provided in the form of a B-tree structure which greatly improves the usefulness by providing an indexed access method for file storage. This B-tree structure together with disc cashe buffering helps increase the speed of file accessing and allows complex programs to be generated with less effort.

It is this extended file handling together with the ability to run MBasic programs that makes Mallard Basic so useful.

## Conclusion

By examining table 1 you can compare and contrast the two versions of Basic. Each has features that make it more useful for a particular task than the other – in general, if you require to perform a lot of file handling but have little use for graphics or sound you would be better off with Mallard Basic. If, on the other hand, you have more use for graphics and sound than for file handling you are probably better off with BBC Basic.

With both versions of Basic it is possible to create the features available in the other. If this is what you want to do then go for Mallard Basic as the file handling is very powerful. Also the way CP/M has been implemented on the Z80 second processor makes it fairly easy to provide the graphics you need by using the CHR$ and USR statements.

◄ Continued from page 139

| | | |
|---|---|---|
| EDIT | cursor keys | Edit a program line |
| END | END | End a program |
| EQV | none | Logical operator |
| EOF | EOF# | End of file |
| ERA | *ERA | Erase a file |
| ERASE | none | Erase an array |
| ERL | ERL | Error line |
| ERR | ERR | Error number |
| ERROR | ERROR | Generate error |
| EXP | EXP | Exponential |
| FETCHKEY$ | none | Fetch the current key value |
| FETCHRANK | none | Fetch the current key rank |
| FETCHREC | none | Fetch the current record number |
| FIELD | none | Define a filed for a file |
| FILES | *DIR | Display the files on disc |
| FIND$ | none | Look for a given file |
| FIX | none | Make a number to an integer |
| FOR | FOR | FOR loop |
| FRE | none | Free space measurement |
| GET | BGET# | Get record from random or keyed file |
| GOSUB | GOSUB | Execute subroutine *(BBC Basic also has procedures)* |
| GOTO | GOTO | Go to line number |
| HEX$ | none | Hexadecimal string *(BBC Basic allows conversion)* |
| HIMEM | HIMEM | High memory point |
| IF | IF | Conditional |
| IMP | none | Logical operator |
| INKEY$ | INKEY$/GET$ | Input key from keyboard |
| INP | INKEY/GET | Input from 1/0 port |
| INPUT | INPUT | Input data from console |
| INPUT# | INPUT# | Input data from file |
| INPUT$ | INPUT | Input fixed length string |
| INSTR | INSTR | Search for substring in string |
| INT | INT | Number to integer |
| KILL | *ERA | Kill file |
| LEFT$ | LEFT$ | Extract left hand part of string |
| LEN | LEN | Determine length of string |
| LET | LET | Preface assignment |
| LINE INPUT | none | Input complete line from console |
| LINE INPUT# | none | Input complete line from file |
| LIST | LIST | List file on console |
| LLIST | LIST | List file on printer *(For BBC Basic precede by CTRL B)* |
| LOAD | LOAD | Load a program into memory |
| LOC | PTR# | Current location in file |
| LOF | none | Length of file |
| LOG | LN | Natural logarithm |
| LOG10 | LOG | Log to the base 10 |
| LOWER$ | none | Convert string to lower case |
| LPOS | none | Line printer position |
| LPRINT | PRINT | Print line to printer *(For BBC Basic precede by CTRL B)* |
| LSET | none | Set string left unjustified |
| MAX | none | Determine the maximum value |

Continued ►

### BENCHMARK NOTES

The benchmark programs are designed to allow comparison of the speed of the different Basics – there are, of course, other ways of writing the benchmark programs that may be more efficient in different versions of Basic.

In particular, use of procedures in BBC Basic may well prove more efficient than the use of GOSUBs.

Benchmark timings usually produce a lot of discussion and the notes here are to provide information about how the timings were arrived at. Version 1.28 of Mallard Basic and version 2.2 of BBC Basic were used for the timings though later versions of both are now available. The later version of BBC Basic should be supplied with the next release of the Acorn software and the current release of Mallard Basic will be supplied to anyone who upgrades their Mallard Basic through Locomotive Software. These later versions of the Basics may provide different timings and anyone who produces these should send them in. Alternative versions of the programs that run quicker or slower are also welcomed.

The results were obtained by timing each program three times and then averaging the results and dividing down by the correct number to get a result for 1000 iterations of the loop. Larger loop counts were used where shown so that a more accurate estimate of the time taken could be obtained. This is because there is a finite delay between observing that a program has finished and pressing the stop button on a stop watch.

This reaction time can become a substantial part of the benchmark timings if the loop count is small. The alternative way of allowing for the reaction time is to take a series of reaction times and average these out and then subtract the reaction time from the benchmark timings. This method was not adopted because the large number of timings required over a period of several days would have meant that the reaction time would have been constantly varying. It should be borne in mind that the timings given contain a small, but variable portion of reaction time due to the way these tests were carried out.

| | |
|---|---|
| Full Mallard v1.28 | 25343 bytes |
| MBasic v5.21 | 30776 bytes |
| BBC Basic v2.2 | 41211 bytes |

**Table 2. Free bytes available after loading Basic**

***See page 131 for details of our special offer to upgrade from the Professional to the full version of Mallard Basic for half price***

◄ Continued

| | | |
|---|---|---|
| MEMORY | HIMEM/LOMEM | Reset memory parameters |
| MERGE | none | Merge two programs together |
| MID$ | MID$ | Select part of string |
| MIN | none | Determine minimum value |
| MKD$ | none | Make double length string |
| MKI$ | none | Make integer string |
| MKIK$ | none | Make integer key string |
| MKS$ | none | Make single length string |
| MKUK$ | none | Make unsigned integer key string |
| MOD | MOD | Modulus |
| NAME | *REN | Rename disc file |
| NEW | NEW | Prepare a new program |
| NEXT | NEXT | FOR loop terminator |
| OCT$ | none | Octal string |
| | | *(BBC Basic allows conversion)* |
| ON | ON | On condition execute code |
| OPEN | OPENIN | Open file |
| OPTION | LISTO | Set various options |
| | | *(LISTO performs part of OPTION)* |
| OR | OR | Logical operator |
| OSERR | REPORT | Return operating system error |
| OUT | none | Output to a port |
| | | *(BBC Basic can perform this in assembler)* |
| PEEK | =? | Peek a memory location |
| POKE | ?= | Poke a memory location |
| POS | COUNT | Console position |
| PRINT | PRINT | Display on screen |
| PRINT# | PRINT# | Print to file |
| PUT | BPUT# | Put data to random access file |
| RANDOMIZE | RND | Randomise the random number generator |
| READ | READ | Read constant data |
| REM | REM | Remark |
| REN | *REN | Rename file |
| RENUM | RENUMBER | Renumber program |
| RESET | *RESET | Reset drives |
| RESTORE | RESTORE | Restore the constant data |
| RESUME | none | Continue after error |
| | | *(No special instruction in BBC Basic)* |
| RETURN | RETURN | Return from subroutine |
| RIGHT$ | RIGHT$ | Extract right hand part of string |
| RND | RND | Random number |
| ROUND | none | Round a number |
| RSET | none | Set string, right justified |
| RUN | RUN | Run a program |
| SAVE | SAVE | Save a program |
| SEEKKEY | none | Seek to a given key |
| SEEKNEXT | none | Seek the next key |
| SEEKPREV | none | Seek the previous key |
| SEEKRANK | none | Seek to the given rank |
| SEEKREC | none | Seek to the given record |
| SEEKSET | none | Seek to next different key |
| SGN | SGN | Sign of value |
| SIN | SIN | Sine |
| SPACE$ | STRING$ | String of spaces |
| SPC | SPC | Print a given number of spaces |

Continued on page 142 ►

```
100 REM Benchmark 1
110 FOR K=1 TO 10000
120 NEXT K
130 END

100 REM Benchmark 2
110 K=0
120 K=K+1
130 IF K<5000 THEN 120
140 END

100 REM Benchmark 3
110 K=0
120 K=K+1
130 A=K/K*K+K-K
140 IF K<5000 THEN 120
150 END

100 REM Benchmark 4
110 K=0
120 K=K+1
130 A=K/2*3+4-5
140 IF K<5000 THEN 120
150 END

100 REM Benchmark 5
110 K=0
120 K=K+1
130 A=K/2*3+4-5
140 GOSUB 170
150 IF K<5000 THEN 120
160 END
170 RETURN

100 REM Benchmark 6
110 K=0
120 DIM M(5)
130 K=K+1
140 A=K/2*3+4-5
150 GOSUB 200
160 FOR L=1 TO 5
170 NEXT L
180 IF K<5000 THEN 130
190 END
200 RETURN

100 REM Benchmark 7
110 K=0
120 DIM M(5)
130 K=K+1
140 A=K/2*3+4-5
150 GOSUB 210
160 FOR L=1 TO 5
170 M(L)=A
180 NEXT L
190 IF K<3000 THEN 130
200 END
210 RETURN

100 REM Benchmark 8
110 K=0
120 K=K+1
130 A=K^2
140 B=LOG(K)
150 C=SIN(K)
160 IF K<1000 THEN 120
170 END
```

**Figure 1. Benchmarks by Locomotive Software reproduced here with their permission**

◀ **Continued from page 141**

| | | |
|---|---|---|
| SQR | SQR | Square root |
| STOP | STOP | Stop execution |
| STR$ | STR$ | String representation of numeric |
| STRING$ | STRING$ | String of particular character |
| STRIP$ | none | Make character 7 bit |
| SWAP | none | Swap the contents of two variables |
| SYSTEM | *CPM/*BYE | Return to CP/M |
| TAB | TAB | Tab forward |
| TAN | TAN | Tangent |
| TRON | TRACE ON | Trace on |
| TROFF | TRACE OFF | Trace off |
| TYPE | *TYPE | Type file to console |
| UPPER$ | none | Convert string to upper case |
| UNT | none | Convert unsigned integer |
| USR | USR | Invoke external user function |
| VAL | VAL | Convert string to numeric value |
| VARPTR | none | Get pointer to variable |
| VERSION | *FX0 | Determine which version of Basic is in use |
| WAIT | none | Wait on an I/O port |
| WEND | none | End of while loop *(BBC Basic has REPEAT/UNTIL)* |
| WHILE | none | While loop |
| WIDTH | WIDTH | Set width of console |
| WIDTH LPRINT | none | Set width of printer |
| WRITE | none | Write to console |
| WRITE# | none | Write to file |
| XOR | EOR | Logical operator |
| ZONE | none | Set print zone size |
| \ | DIV | Integer divide |

*Note: several of these statements have many options and can be used to create numerous effects. Of particular note in this respect is the OPTION statement in Mallard Basic, and the VDU and *FX statements in BBC Basic. The notable omissions from Mallard Basic are the ability to handle the graphics and sound facilities of the BBC micro, but these facilities could be included by use of the CHR$ and USR statements. Several of the statements in Mallard Basic, although not directly achievable from BBC Basic, could be created by using the VDU and *FX commands in conjunction with other statements. The main omission from BBC Basic is the ability to handle random files and it falls very short of file handling when compared to Mallard Basic. In general, use BBC Basic for machine specific work and Mallard Basic for non-machine specific work.*

**Table 1. Comparisons of Mallard and BBC Basic statements**

| | Mallard v1.28 | MBasic v5.21 | BBCBasic v2.2 | Mallard v1.28* |
|---|---|---|---|---|
| **BM1** | 0.52 | 0.8 | 0.54 | 0.4 |
| **BM2** | 1.84 | 2.45 | 2.06 | 1.61 |
| **BM3** | 4.81 | 6.69 | 7.01 | 4.45 |
| **BM4** | 4.94 | 6.57 | 7.65 | 4.57 |
| **BM5** | 5.5 | 7.15 | 8.12 | 4.89 |
| **BM6** | 9.72 | 12.94 | 11.56 | 8.43 |
| **BM7** | 15.36 | 20.57 | 16.79 | 13.46 |
| **BM8** | 17.03 | 34.56 | 21.67 | 16.4 |
| **Average** | 7.46 | 11.46 | 9.42 | 6.78 |

*All timings are shown in seconds for a thousand iterations of the loop. See 'Notes' for further details of programs and timings.*

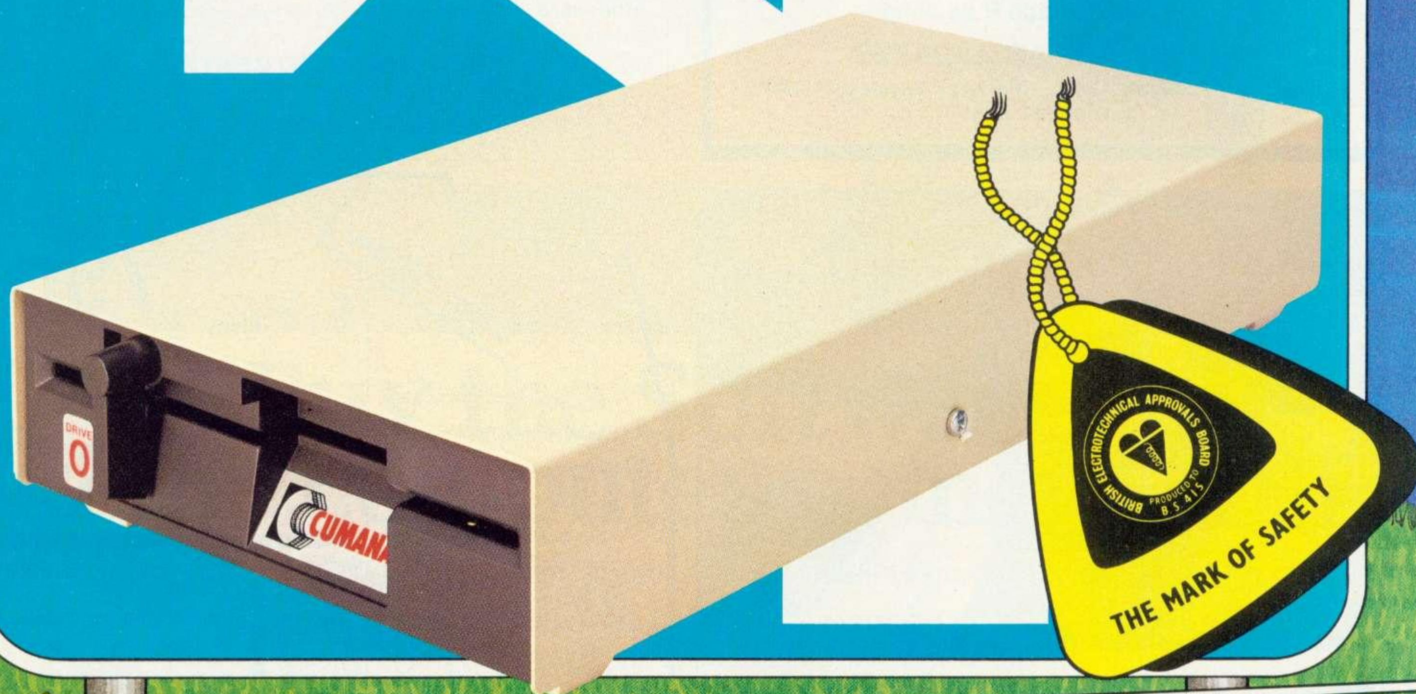
**Timings carried out with the OPTION RUN statement as the first statement of the program. This means that Mallard Basic will not look for CTRL C while the program is running and will therefore run faster.*

**Table 3. The results of running the benchmark listings in figure 1**

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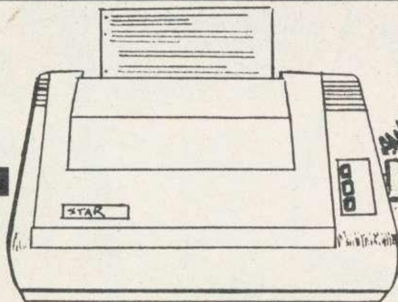
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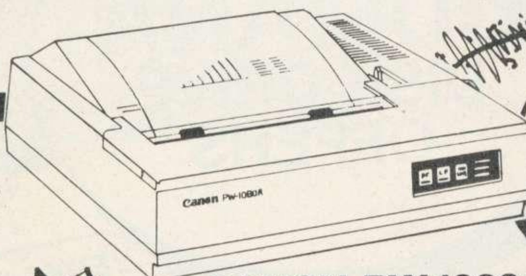
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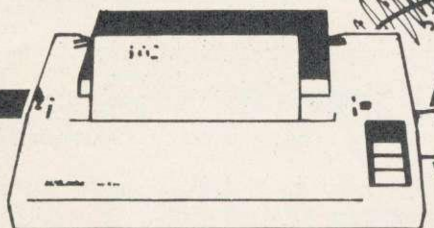
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# EDUCATION

## NEWS

# European standard is cause for excitement

Acorn's announcement that it is to set up a standard for educational computers in partnership with Olivetti and the French computer company Thomson, is a cause for great excitement, but also poses several important questions.

A standard in any field of computing implies portability (the ability to transfer programs, routines and applications between different machines). Such a standard could only benefit schools in this country and across Europe.

We hear much talk of the CP/M and MS-DOS standards in personal computers, which allow some degree of portability between various machines, but what will the Acorn wizards want to settle on? Will their own MOS be up to the needs of the future? Will European educationalists want to support that type of venture, initiated, it seems, by the leaders in educational computing who cannot balance their books?

Will countries such as France, which have already standardised on other machines, for example, the Micral, want to take on a 'new wave' of micros? Will this country want to do it?

Taking the last question first, this all depends upon what is the objective. If we are merely looking at a machine that is intended as the next stop-gap between the BBC B+ and the ultimate configuration for education then it is unlikely that schools will want it.

If, on the other hand, it can be seen as part of a progression towards a stated objective which has clearly defined steps of development, then it is more likely to convince and be accepted by the public at large and the education authorities in particular.



**Acorn's B+: will the European standard lead to a machine that is just a stop-gap between this and the ultimate computer for education?**

### Objectives

An important feature in this matter *should* be the new MSU (Microelectronics Support Unit) to be set up in April 1986 to replace the MEP (Microelectronics Education Programme). The stated objective of the MSU is to develop support materials for software packages to enable their integration into the curriculum.

Further, it aims to provide an efficient Information Service to support LEAs in their training and support of teachers. Such a unit is tailor-made, by virtue of its structure, to help plan the future in tandem not only with Acorn but also with all the other interested companies with a slice of the education market.

If this is truly to be a European venture, then how about a European MSU, based on our own organisation, European ones and the interested hardware and software companies? Another question is, is it appropriate for the hardware company to be defining the way forward? Should this not be a national initiative? Or are we merely doing our usual trick of allowing someone to come up with a good idea and then letting it fail from lack of support? Acorn should be applauded for its vision and, more pertinently, its courage in putting forward such an adventurous and imaginative idea.

It is to be hoped that national and local government will not just wish it success but will also give it the necessary support and expertise to achieve its objective.

**Commentary by Nick Evans**

## Administration aid launched

Hutchinson Software has published a major pack for the BBC micro, *QADMIN* at £65, to help with school administration. As the front cover proclaims it 'keeps a full record on every pupil, easy to produce form lists, exam entries, etc, robust and flexible'.

These claims are justified since this package is well integrated – that's to say, the programs use common files for a multitude of purposes. For example, if you are producing the examination entries there is no need to key in the names of all the pupils again – you simply use the same lists you have been using all along in other areas of administration.

The key to this integration is the fact that the whole suite of programs revolves around a well-tried and reliable random-access database – *QUEST* from the Advisory Unit for Computer Based Education in Hatfield. With this package it's possible to produce form lists, pupil profiles, option lists, examination timetables and various other list-based functions. It requires no computer experience since everything is done by following easy instructions.

This powerful tool may be used in a variety of ways by exploiting the power of ready-prepared dedicated databases. Because of its common file structure this package is capable of greatly reducing the work load of both administrators and staff alike, and schools using a number of different packages for the varied tasks of administration would be well advised to take a look at at it.

Contact Clare Wileman, Hutchinson Software, Freepost 5, London W1E 4QZ.

# EDUCATION

## NEWS

### Cash encourages software initiative

Local education authorities are increasingly being offered licences to distribute software to schools in their area, especially since the Department of Trade and Industry has put up £3½ million for the purchase of software over the next three years.

LEAs can choose to use the money in bulk purchase or split it between their component schools for software purchase.

The funding is to be matched by the LEAs, after the first £500,000, so that the government is seen to be aiding, and not totally supporting, the software initiative.

The reasons for this generous initiative are fairly straightforward. With the demise of the MEP a great fund of computing expertise will be re-distributed nationally and software production, with a few exceptions, is going to cease completely.

All programming is being handed over to private enterprise and the government hopes that this funding will give the industry the cash necessary to come up with exciting new ideas.

My personal feeling is that the LEAs must be careful what they buy into as the quality of software varies greatly. If this money is not to be wasted the LEAs should take advice from experts as to what they should purchase before the software cowboys move in.

## Small companies aim high

Tuxsoft and British Educational Software Supplies (BESS) are two small software producers which aim at the primary age range and produce a surprisingly high standard in software.

Tuxsoft features three packs. Pack A contains three programs – one deals with the difficult concept of negative numbers. The child has to move Norman up and down his number line, and every five goes, has a chance to play 'place the number'.

*What's the Temperature* and *Ghost Game* extend the concept of directed numbers.

Pack B features arithmetic questions with a wide variety of zoo animals who come to your rescue when you are in difficulties. Mental arithmetic is the main theme.

In the final pack the child is tutored and tested in tables in a fairly conventional but efficient rote fashion. These programs will appeal to teachers wanting a change in the class and parents worried about their children's arithmetic skills.

BESS also aims to fill a need in the primary mathematics field and claims that its programs are widely used in this country. In its notes to me, it points out that they have been created by a teacher with 27 years experience; they integrate easily with existing maths schemes and they 'are proving effective in re-engaging the interest of primary teachers' with 'unhappy experience with poor software'.

The company is also willing to provide LEAs with a licence to copy within their area for £100 per program.

The software is vivid, graphically interesting and imaginative. I enjoyed most of the program, despite being a seasoned and rather jaded campaigner in this field. A wide variety of topics are covered, including simple counting, co-ordinates, route planning, number order, time, compass and bearings in general.

Contact Tuxsoft, PO Box 1, Tuxford, Newark NG22 0JY. Tel: (0623) 863952.

BESS, Ellesmere House, Keyingham, Hull HU12 9SP. Tel: (09644) 2279.



Fletcher's Castle from Fernleaf

## Software and TV tie-ins for schools

Fernleaf Educational Software's *Fletcher's Castle* and *How We Used to Live 1902-1926* have been used by many schools in direct conjunction with the *Zig-ag* and *How We Used to Live* television programmes from the BBC and Yorkshire Television respectively.

Fernleaf, in common with several other software producers, is now producing a *Norman England* pack which promises to provide an additional resource to tie in with the various celebrations taking place in 1986.

Contact Fernleaf, 31 Old Road West, Gravesend DA11 0LH. Tel: (0474) 359037.

## Satellite project pictures for free

Further to my item in November about the Clifton College, Bristol, Satellite Project and the demonstration of their results on the Acorn stand at the *Acorn User* Exhibition last July, the pictures are now available on disc, free of charge. All you have to do is send a disc, suitably packaged with return envelope and postage, plus your own address, to Clifton Satellite Project, Technical Activities Centre, Clifton College, Bristol BS8 3JH. Please mark the envelope PICTURES.

A single-sided disc will receive four pictures, double will get eight. In addition, a regular, termly newsletter is to be sent out to all interested parties, provided that you supply stamped addressed envelopes.

Judging by the standard of information in the first one it seems to be a good deal!

As this is not a business enterprise but merely a school giving freely of its time and goodwill, please do *not* contact them for advice concerning satellite communications, other than by requesting their newsletters.

**EDUCATION TOP FIVE**

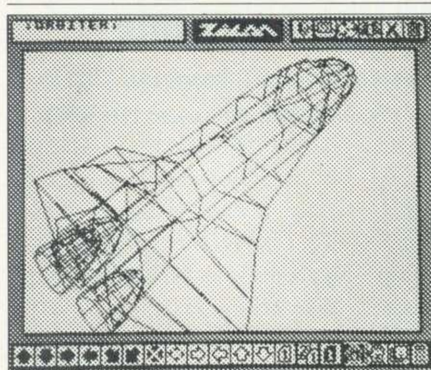
| | Title | Publisher | Cassette | Disc | ROM | Electron | Shadow on B+ | 6502 | Econet |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Music System | Island Logic | £31.15 | £31.20 | — | — | Yes | — | Yes |
| 2 | Creative Graphics | Acornsoft | £9.95 | — | — | Yes | — | — | Yes |
| 3 | Maths (various packages) | Longman | — | £17.50-£29.95 | * | — | — | — | — |
| 4 | Clares Beta Basic | Clares | — | £25 | — | — | Yes | — | — |
| 5 | French | Pan | £14.95 | £19.95 | — | Yes | — | — | — |

Compiled by Gallup/Microscope. *Contact publishers: Island Logic System, 12 Collegiate Crescent, Sheffield S10 2BA (0742) 682321; Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD (0223) 214411; Longman, 62 Hallfield Road, Layerthorpe, York YO3 7XQ (0904) 425444; Clares, 98 Middlewich Road, Rudheath, Northwich, Cheshire (0606) 48511; Pan, 18-21 Cavaye Place, Fulham Road, London SW10 (01) 373 6070.

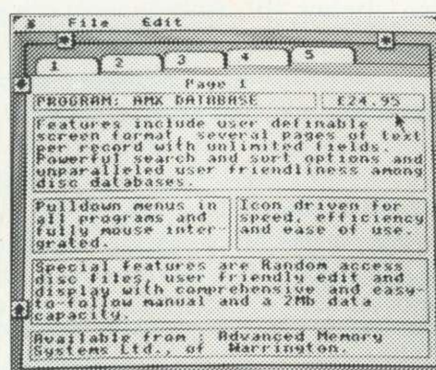
# Now you can stretch your imagination, without stretching your budget.



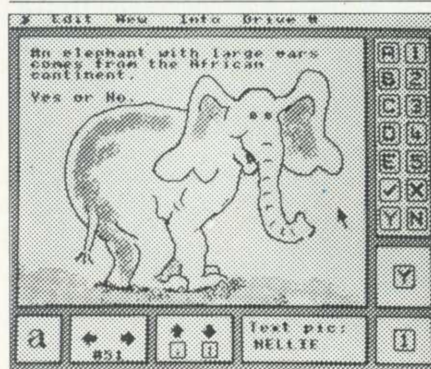

AMX PAGEMAKER
£49.95 INC VAT, 2 ROMS + DISC



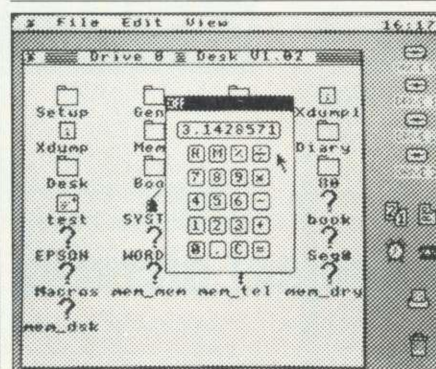
AMX 3D ZICON
£24.95 INC VAT, DISC



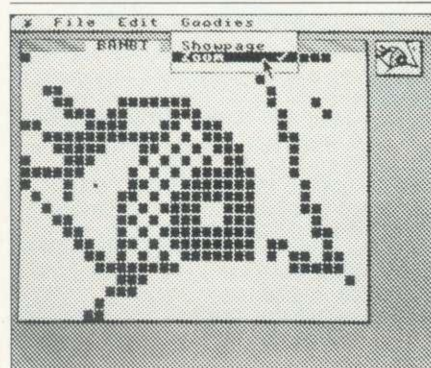

AMX DATABASE
£24.95 INC VAT, DISC



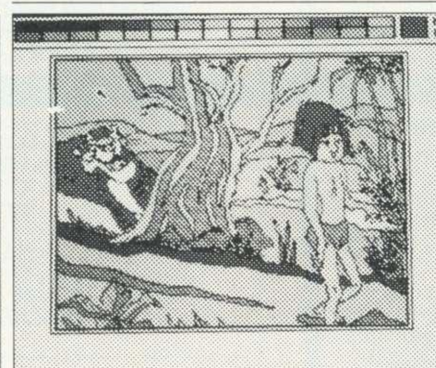

AMX XAM
£24.95 INC VAT, DISC




AMX DESK
£24.95 INC VAT, DISC




THE ORIGINAL AMX ART PLUS UTILITIES
£14.95 INC VAT, DISC



AMX PAINT POT
£14.95 INC VAT, DISC

From Advanced Memory Systems comes an irresistable selection of Icon driven software that AMX Mouse, ROM and AMX Super ROM owners can really get their teeth into!

Seven incredible programs, so comprehensive, they will more than satisfy even the most demanding BBC Micro user and when coupled with the AMX Mouse will broaden the horizons of the BBC Micro to new, undreamed of standards of sophistication.

## AMX PAGEMAKER.

A fantastic high resolution A4 Typesetting and Artwork system.

Comprising 2 ROMS (8K and 16K) 'Pagemaker' features a fast scrolling A4 page.

There is a wide selection of typefaces and user definable fonts.

You can load in Wordwise and View files or type directly onto screen.

An incredible 'Cut and Paste' facility includes copying, rotating, stretching and zooming.

For the professional touch there is N L Q high quality dump, and you can dump any part of, or full A4 page.

## AMX 3D ZICON.

Now, with a 3D ZICON you can transform three dimensional vector data and translate them into on-screen graphics.

You can Print or Plot graphics to suitable peripherals and produce output suitable for other AMX programs such as ART – UTILITIES and Paintpot.

There is even the facility to sketch in two dimensions and convert to three dimensions and auto swaps generator.

Some interesting example objects on file include – helicopter – jet plane and dodecahedrom.

## AMX DATABASE.

Database is a brand new super filing program featuring 1000 records and unlimited fields per record.

It has a powerful search and sort facility and user friendly edit and display.

In fact it is probably the most advanced user friendly database available today.

Special features include: User definable screen format for record display – random access files – super fast sort – flexible printer dump and screen display.

## AMX XAM.

A brand new and exciting educational program with maximum flexibility, allowing a multitude of options and variations.

With XAM you can create a multiple choice exam which would not be alterable by the examinee.

And you can incorporate within the questions, your own pictures, created on AMX ART, building the finished picture into the quiz and providing an extra and fascinating aspect to the examination.

## AMX DESK.

The complete home or office acquisition.

You will wonder how you ever managed without AMX Desk.

Just point your Mouse and select the following additional aids:

MEMO-PAD for up to three pages of text

TELEPHONE/ADDRESS BOOK with 200 or 400 scrolling entries

DIARY with three months calender

ALARM to remind you about appointments

CALCULATOR – Yes! A full function calculator that cannot be lost or suffer flat batteries, and any window can be dumped to your printer at the touch of a button.

## THE ORIGINAL AMX ART PLUS UTILITIES.

Now available as a single package – two of AMX's most popular programs.

AMX ART is a superb mode 4 graphics program, making full use of windows, icons, menus and pointers, it allows you to create your own pictures and the host of graphic features in AMX UTILITIES including a fantastic zoom facility for accurate amendments to your ART pictures – one dot becomes a character.

You can also move, copy, rotate, reflect, enhance circles, draw ellipses and arcs, even print icons.

Border can be added and pictures stripped and centred for saving and printing. All pictures can be loaded into AMX PAGEMAKER, AMX 3D ZICON, AMX XAM, AMX PAINT POT, and AMX SUPER ART.

## AMX PAINT POT.

The pictures you have created with AMX ART and enhanced with AMX Utilities can now be coloured in, using PAINT POT.

They will burst into life with rich, vibrant colours, and with a palette of 256 different shades you should not be short of inspiration.

You can even store up to 20 Illustrations in Picture Show mode, then display them in sequence.

To start you off we have included eight exciting pictures in the program.

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EDUCATION

# A NEW DIMENSION IN EXPRESSION

**Children can be spurred to new heights of creativity when freed by a wordprocessor from the laborious task of writing, but you must choose the right tool for the job and age-group**

***Chris Drage and Nick Evans***

Wordprocessors play a vital role in educational computing. For many children, expression through the written word is still a tedious and laborious task, but let them loose on a wordprocessor, suitably matched to their level of understanding and ability, and their sudden motivation to write has to be seen to be believed, and written expression takes on a new dimension.

Choosing the right tool for the job can be a problem, however, as a wide range of wordprocessing packages are available for the BBC micro.

This month we'll help you choose from a number which represent a progression of skill levels from those suitable for very young children, with limited keyboard expertise and sight vocabulary, to sophisticated systems with a wide range of options.




Wordprocessing can start in the infant school. From the variety of software available for this age group, two which have enjoyed particular success are *Prompt 2* and *Stories Suite*. The former program is available free of charge from any Special Education Microelectronic Resource Centre (SEMERC). It has limited wordprocessing facilities, yet these are appropriate to the level at which it is aimed. Printing and deleting are possible, as is cursor movement around the screen and coloured text and graphics. Only one page of text may be created and edited at a time.

The major strength of *Prompt 2* is its ability to use the Concept Keyboard. The creation of the teacher's own overlays and files is easy. *Prompt 2* is certainly not the solution to the problem of wordprocessors for children but it does provide the young with an uncomplicated entry to the world of wordprocessing. A far more substantial package is *Stories Suite* (see review in *Acorn User* June 1985 issue, page 145). Its strength lies in the fact that it is an integral part of a wider development including *Scenes Suite* (for pre-readers and special school children), and *Pageant* which allows branching stories to be written. Again, the Concept Keyboard may be used.




*Stories Suite* is a structured set of six programs designed to aid language development from early word recognition, through story writing with whole word or phrase input, to more advanced reading-for-meaning exercises. The word files can be changed in most of the programs, and Concept Keyboard overlays easily made by the teacher.

Through the suite children are encouraged to write stories by being able to touch and explore words and to see their stories in large, clear letters. Children with reading ages of 4 to thirteen are catered for.

*ABC* from Acornsoft is ideally suited to 7 to 9-year-olds. It really is a wordprocessor for children and it features a number of fundamental attributes of wordprocessors without being overly complicated. It represents the next stage of development in acquiring wordprocessing skills.

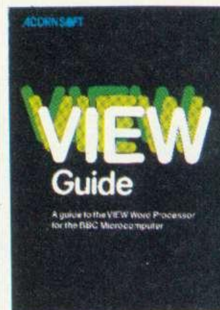
Using all 10 function keys in a pictorial fashion, *ABC* has a fine complement of editing commands. You can insert, delete, move and replace words and screens of text very simply. The use of delete is impressive, but sadly, the Break key has not been disabled and text can be lost accidentally.

It is unique in that it has three types of display screen. There is the main write screen, a read and write screen, and a slate screen. The slate screen is particularly interesting as it provides the child with notebook facilities where ideas can be jotted down without affecting the main text. These can be edited and copied to the main writing area. Formatting parameters may be set by the teacher or child from a print options page.

Schools using *View* will be pleased to find that *ABC* contains a utility to convert *ABC* files into *View*-readable files. Its design, layout and features make it well-suited as a bridge between infant programs and sophisticated ROM-based systems.

With proficiency in keyboard skills, children should be able to move quite quickly to a full wordprocessor such as *Edword*, *View* or *Wordwise Plus*.

I have used each of this trio with young children and, for a variety of reasons, I have found *Wordwise Plus* ideal (reviewed in *Acorn User*, February '85 issue). It's easy to learn, has extremely good safety-netting and uses a 40-column screen which is important as most classrooms have standard resolution monitors. (*View* also has a 40-column mode but the windowing effect that it utilises is confusing to young children.)




With 8 to 9-year-olds who have graduated to *Wordwise Plus*, I use a standard layout for their poems and stories. Overlooking embedded commands completely, the children concentrate on simply writing, printing, editing and reprinting their work. The formatting of their text is preset: I have one format for stories, a similar one for poems, another for letters. The advantage of this approach is that children become familiar with *Wordwise Plus* quickly. The green and

white codes are shown by <G>,<W>. LNS (line numbering) is selected to provide a reference when previewing the text. The first embedded command refers to the *Wordease* menu option.

One of the powerful features of *Wordwise Plus* is its programming language and memory organisation (called segments). Beebugsoft's *Wordease* is an outstanding package of utilities written in *Wordwise Plus'* programming language to enhance this wordprocessor. Features I find particularly useful in the classroom are: the ability to save text automatically with an incremented filename; the Epson-type hardcopy codes at the press of a key; the excellent menu; the simple mail merge and label printer (for teacher use); and the ability to copy to and from segments and the main text area, providing a full notepad facility.

If you're serious about using *Wordwise Plus* in the school, then the extra £21.50 for *Wordease* is money well spent. Busy teachers who don't have the time (or inclination) to adapt *Wordwise Plus* to children's needs will find *Wordease* extremely valuable.

*Edspell*, developed by the MEP, is a very fast spell-checking package for use with text files produced with *View*, *Wordwise Plus* and *Edword Plus*. There is great value in allowing children to check their spelling via this type of program, because far from creating 'lazy' spellers, it has the reverse effect of actually focusing children's attention on the words highlighted. They must make decisions regarding whether the word is an error or simply one not recognised by the program.

*Edspell* is an ideal program for 8-year-olds upwards, as it is so simple to use. It's supplied with a 6000 word dictionary which can be expanded to 8000 or 18,000 words depending on whether you use 40 or 80 track drives. Class dictionaries of up to 1000 words can also be created for use.

*Edspell* contains its own wordprocessor which is really just a simple text editor/printer. As its operation is very similar to *Wordwise Plus*, children used to the latter have no problem editing their work in *Edspell*.

Where *Edspell* scores is in being disc-based and thus portable. As its supplier allows several working copies to be made in a school, each class may have its own dictionary.

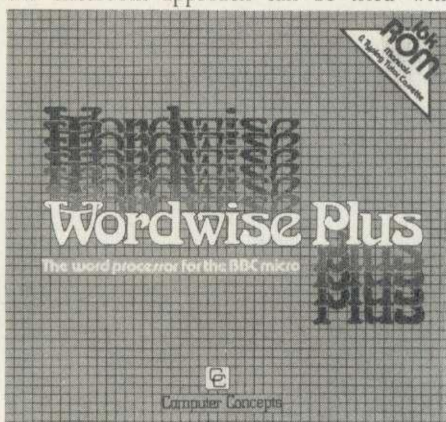
There's no doubt that *Wordwise Plus*, *Wordease* and *Edspell* represent an extremely versatile and powerful combination in classroom wordprocessing.

### Secondary sector

If we move into the secondary sector, however, the implications of wordprocessing for a wide variety of curriculum areas are extensive. First, children are given the facility to draft and re-draft materials, a facility that should be equally available to the chemist and biologist as it is to the pupils specialising in humanities or English.

There are, as well, also administrative and organisational problems. Whereas in a junior or middle school one is likely to have the same class for a length of time, and therefore computer use can be occasional for the pupil and continuous for the computer, in secondary schools, because of the structuring of the timetable, the facility is only available for short 'bursts' of time and thus, without multiple computers, use is necessarily limited.

What are the alternatives? If the school uses a 'computer room' then, provided there is supervision and the arrangements are satisfactory, squads of pupils may spend lesson time undertaking their tasks there. The computer in the classroom approach can be tried with groups editing jointly produced documents, which not only brings together the expertise of several minds, but also tends to concentrate the thoughts of the pupils much more than when working in isolation. Individual, cyclical use of one computer in a class of 25 children is just not satisfactory and the machine becomes redundant for the majority of the class.



**Wordwise Plus: for 8-year-olds upwards**

In secondary schools it will not be long before the pupils arriving in the classes are already fully conversant with a wordprocessor – most likely one of those already mentioned.

The two main contenders for serious use with this age group have to be *View* and *Wordwise Plus*. Both have redeeming features and draw-backs for educational use, but they are also very much up to the task in most circumstances, and are flexible, reliable and easy to use.

*Wordwise Plus* offers various facilities and extensions including continuous processing. *View*, on the other hand, is a package which is compatible with a variety of associated tools – *Viewsheet*, the spreadsheet from Acornsoft and its database partner *Viewstore*. Both will receive from and pass files to *View* and so the packages build into a coherent whole. That may not be your objective, though.

If you wish to teach wordprocessing in an office practice environment, for example, then you may wish to use something which makes the facilities of the wordprocessor much more easily visible. *Wordwise Plus* does this in that all control codes are seen on screen whereas *View* is perhaps more of a 'user's' package.

It really is a case of 'you pay your money . . .'. Ask yourself why you want to use wordprocessing. These are a few of the possible answers:

You may want to motivate pupils with motor difficulties using the wordprocessor as a remedial tool. There have been many valuable studies on this and several packages prepared specially for this task - *Prompt2* for example.

Your aim may be to give children the freedom to create and then modify, thereby releasing them from the negative situation of having to scrap one effort in order to improve on it.

You may be looking for a means to present work in an attractive and professional manner, or want to use it yourself for worksheets, examinations and records. As a focus for group work it takes some beating in whatever age group you teach.

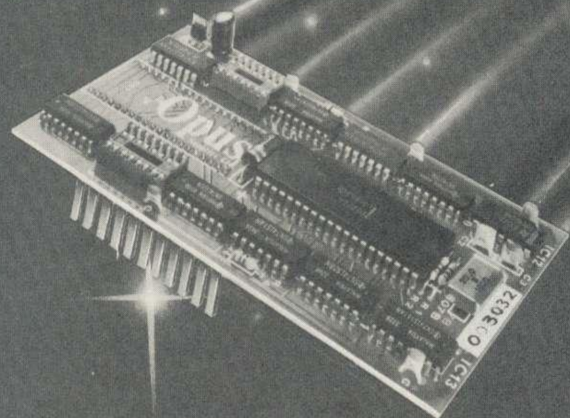
One sideline has emerged on the wordprocessing front that will undoubtedly be developed in the next few months.

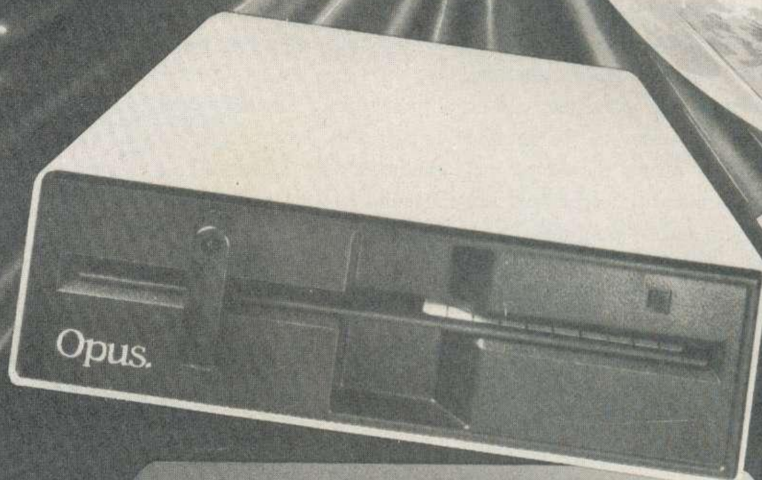
Both AMS and Mirrorsoft are producing a newspaper front page creation package – wordprocessing in real-life action. Tie this in with other dynamic packages and you have the makings of an exciting time for all concerned in the classroom.

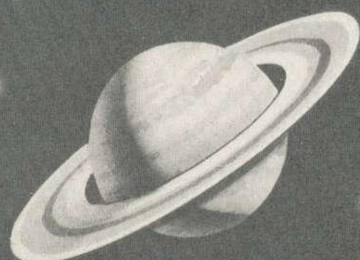
*If you are using the Logo language in your school, check out Joe Telford's article on page 77 of this issue where he develops a Logo wordprocessor.*

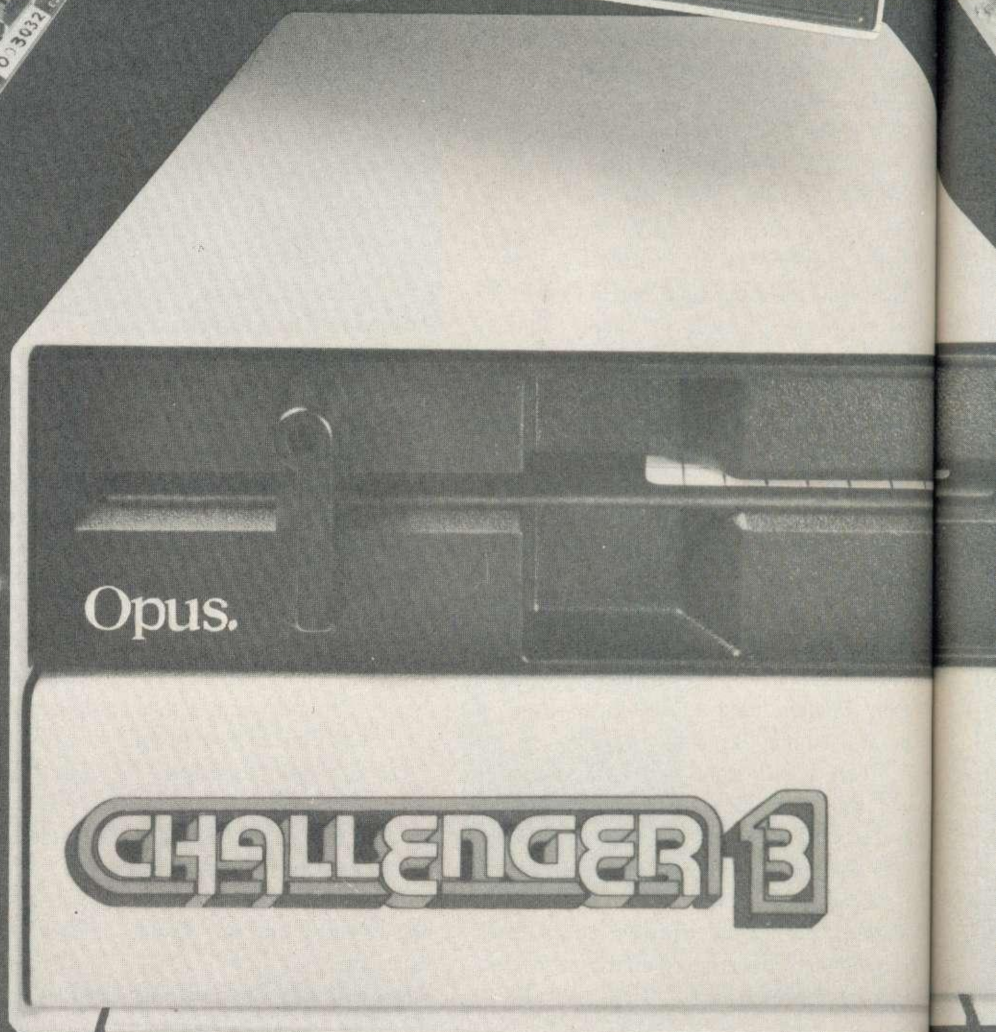
**Stories Suite** £25 cassette, £30 disc
Page Educational Software, 17 Pagefield Crescent, Clitheroe, Lancs BB7 1LH.
**Wordease** £21.50
Beebugsoft, PO Box 109, High Wycombe, Bucks HP10 8NP.
**Wordwise Plus** £56.35
Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. Tel: (0442) 63033.
**Edspell** £17.95
Learning and Training Systems, Haydon House, Alcester Road, Studley, Warwicks B80 7AP. Tel: (0386) 792617.
**View** £59.80
Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411.

# CHALLENGER







# Simply light years ahead of the opposition

Opus announce the biggest disc drive breakthrough for years – CHALLENGER. It could make every other disc system for the BBC micro outdated overnight.

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– Up to 20 times faster than disc drive and providing a massive 256 K of RAM

## ALL THIS IN A SINGLE UNIT FOR AN AMAZING £249.95

And just look at the storage capacity of this remarkable stand-alone system.

Our 5¼" disc drive and built in double-density disc interface – an extended version of the highly praised Opus DDOS, voted fastest system by 'Acorn User' and favourite choice of 'A & B Computing' – combine to give you a powerful 1 Megabyte system. But Challenger has a third dimension, a super fast Solid State RAM DISC for instant access to an additional 256 K of RAM. Effectively a lightning fast second disc drive which can be upgraded to ½ Megabyte capacity for only £49.95. It makes Challenger superior to a dual disc drive, giving faster access and less wear and tear on your drive.

Challenger uses the same disc controller chip as the new BBC B+ computer making it compatible with all leading software titles. Call us for our full compatibility listing.

We've provided a selection of utilities on ROM and Challenger's disc drive is 40/80 track switchable. The extended DDOS takes no User RAM, PAGE, the position at which BASIC programs load, is left unchanged, normally staying at &OEOO, and Challenger dynamically moves files on the disc to overcome the 'can't extend' problem.

Challenger's price of £249.95 includes our unbeatable two year warranty, a full operating manual, VAT and free delivery. Call us now on 0737-65080 for details of our nationwide dealer network or simply post the coupon below.

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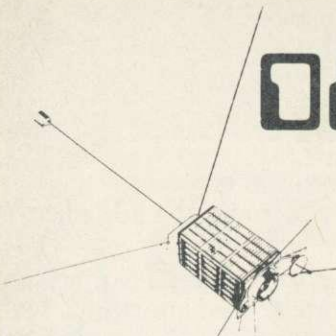
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ASTRID operates FULLY AUTOMATICALLY – using the remote control on your tape recorder – for those night time passes!

ASTRID is only available from the manufacturers. Please send cheque or postal order (or use your Barclaycard or Access number) for £149 fully inclusive of VAT and P+P to MM Microwave Ltd., Kirkbymoorside, York YO6 6DW. Tel: 0751 31620.

Additional software is available for the Spectrum and BBC/Electron giving satellite predictions etc. and facilities for better data presentation. For full information on the ASTRID system and other suitable computers, contact us as above.

AA60



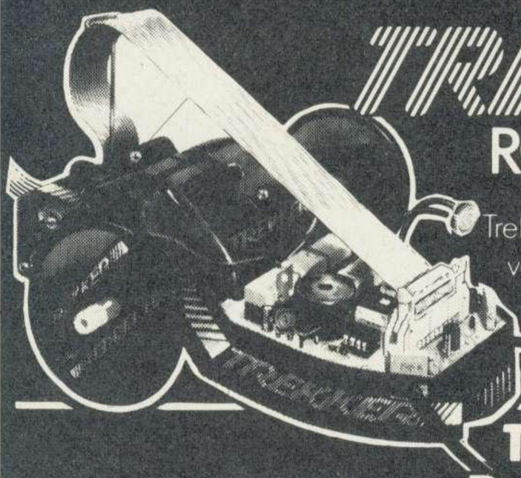




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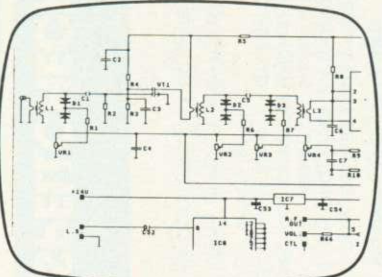
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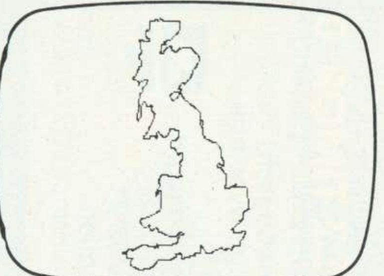
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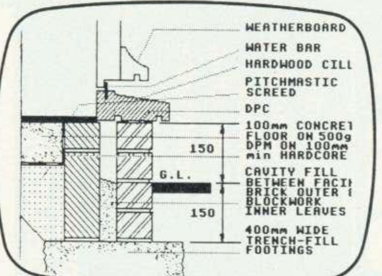
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IT COMBINES IN ONE DEVICE ALL THE FACILITIES OF PREVIOUS ATTEMPTS AT INPUT DEVICES. THE APPLICATIONS ARE AS NUMEROUS AS THAT OTHER COMMONLY HELD DEVICE–A PEN!–AND INCLUDE:

● Option Selection ● Form Input ● Data Collection ● Logic Design ● Circuit Design ● Picture creation ● Picture storage ● Picture retrieval ● Construction design ● C.A.D. ● Text Illustration ● Games ● Pattern Design ● Education ● PCB Design

SPECIFICATION

**Resolution:**
1280 x 1024 pixels

**Repeatability:**
1 pixel

**Output rate:**
2000 co-ordinate pairs per sec.

**Interface:**
parallel

**Origin:**
LH corner or selectable

**Dimensions:**
350 x 260 x 12 mms.

***EXPORT AND DEALER ENQUIRIES WELCOMED***

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TO: GRAFSALES LTD.

Unit 8, Derby Works, Carey Place, Watford, Herts, WD1 2LR. Tel: (0923) 43942

Please supply____GRAFPAD(S) II for*________MICRO at £59.50 plus £2.50 p&p or £8 courier insured delivery.

*Please indicate for which machine.

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## FOR THE BBC MICRO

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Rom
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**Basic programmer's aid in 16K Rom**

Toolkit, chosen by thousands of BBC users, has now been re-written.

- Full screen Basic editor (Wordwise-like in use). Fully integrated and works in any mode
- Syntax checker to spot mistakes as you program.
- Host of new commands & features
- Upgrade available. Phone for details.

## PROGRAM BUILDER

Disc
£21.00
Tape
£16.00



**60 handy Basic routines ready to slot into your own programs**

Don't bother re-writing routines that have already been professionally coded.

Fully documented routines include: input validation, data entry, circles, ellipses, graphics, passwords, string handling, date validation, sorting, screen dump etc etc

## ROMIT

Rom
£34.00



**RAM filing system and silicon disc facility will put your own Basic (or Wordwise) programs onto Eprom.**

- Simple to use, supplied on 16K Rom
- We can even blow the Eproms for you
- Allows you to use sideways Ram as a printer buffer
- Over 20 new commands

## STUDIO EIGHT

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£22.00
Tape
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The sound studio. Contains over 20K of machine code which converts your BBC micro into a 4 voice synthesiser with an 8 track digital recorder with rhythm and drum machine.

**A truly exciting real-time studio system.**

## Other Programs From




- Sleuth
- Masterfile
- Exmon II
- Help
- Discmaster
- Dumpmaster
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- Hershey Characters
- Paintmaster
- Teletext

## WORDEASE

Disc
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Rom
£29.00



**The Wordwise Plus utility disc**

Adds new features such as Mail merging, Label printing, Copy (or move) seg. to seg., Auto-version no. save, Auto-printer codes, Programming Utilities, Auto-section renumber . . . and much more, to your Wordwise Plus.

- Menu driven & easy to use
- As approved by Computer Concepts

## ICON MASTER

Rom
£34.00




**Icon Control System**

This pack automates the creation of an icon-driven user interface.

Supplied on 16K Rom it allows you to design a screen containing icons and then use it in your own programs, in place of a normal menu.

Compatible with AMX mouse & AMX icons.

## ORDERING INFORMATION

**All products are available from your local dealer or directly from Beebugsoft.**

Prices include VAT.
Please add 50p post & packing.

**Mail Order: Beebugsoft, PO Box 109, High Wycombe, Bucks, HP10 8NP**

**Access and Barclaycard**
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**Further Information**
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Now in 16K with 2000 words in Rom

Even faster. On test timings . . .
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Comes with 6000 word dictionary disc.
Upgrades from Spellcheck.
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# ICON MASTER — Icon Control System

## GIVE YOUR PROGRAMS THAT PROFESSIONAL TOUCH

**This pack automates the creation of an icon-driven user interface. It is supplied on a 16K Rom and allows you to design a screen containing icons and then use it in your own programs, in place of a normal menu.**

It is easy to use and may optionally be controlled with the AMX mouse. Icons (sample sets provided) are designed on a special Icon screen editor and are compatible with AMX icons.

Having designed the icons, the next step is to select the Menu editor and design your final screen. You may position your icons and text wherever you choose on the screen. Icon Master then generates the code to append to your Basic program which will reproduce your icon screen and handle user input.

Your own icon-driven programs may be used with or without the Icon Master Rom in your machine.

# ROMIT — Put your own Basic programs into Rom

## CREATE YOUR OWN SILICON DISC

**RomIt is a 16K Rom which adds a new feature to your BBC Micro — A Ram Filing System. This provides over 20 new commands which enable you to:**

**1.** Create a silicon disc with its own filing system commands. Type ⋆RAM, then you can catalogue the 'disc', save and load files to it, storing as many files as memory will allow. You will need sideways Ram to use this facility.

**2.** Put your own Basic or assembler programs (or any file) into Ram and then make them into Eproms. Whether it's your favourite game, your function key definitions or any program that you use frequently, you can now put it into Eprom so that it's always instantly available.

Your Eproms will work with or without the RomIt chip in your machine, and so you may pass on copies of your programs to other people.

Getting your own Basic program into Rom couldn't be simpler. Just load your program into memory and type: **⋆RAM ⋆TRANSFER "prog" ⋆DOWNLOAD** and either connect it to a blower, or send the disc (or tape) to us, together with your RomIt registration number, and we will Rom it for you. (There is a small charge for this service).

**3.** Use your sideways Ram as a printer buffer so that you can continue to use your computer for other work at the same time as printing long documents.

Over 20 new ⋆commands are provided by RomIt

To get the most from RomIt you will need sideways Ram fitted to your computer, eg just a single Ram chip plugged into your ATPL (or other) Rom board.

# ICONMASTER £34.00 ROMIT £34.00 inc. VAT

Available from your local dealer. **Supplied on 16K Rom.**

For further information: Tel St. Albans (0727) 40303

24 hour Access & Barclaycard hotline
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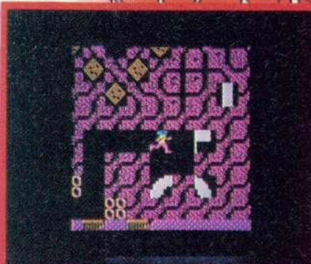
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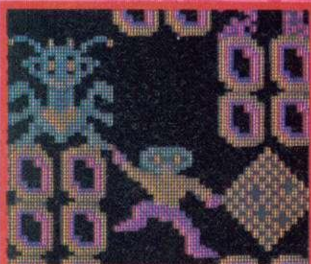
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MORE THAN JUST A SEQUEL, A NEW EXPERIENCE

# REPTON 2

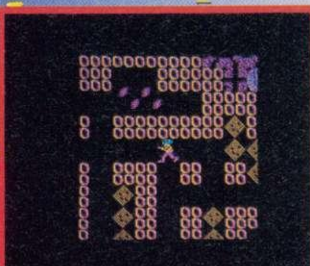

COLLECT THE PUZZLE PIECES

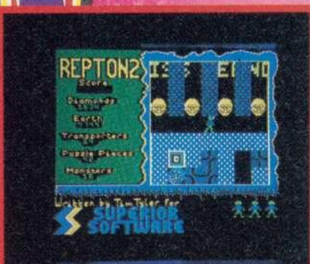

THE PUZZLE PIECES IN POSITION


CLOSE-UP OF A MONSTER




DODGE THE METEOR SHOWERS


WATCH OUT FOR THE BLIND SPIRITS



ACORN ELECTRON VERSION

## REPTON 2

REPTON met with unanimous acclaim from games players and reviewers alike. Now, totally redesigned and rewritten, we bring you a new experience... REPTON 2 — a challenge even for hardened REPTON addicts! Not only must you collect all the diamonds (more than a thousand in total), you must also find the 42 jigsaw puzzle pieces which have been strewn throughout the 16 levels. The levels of play, each 16 times the size of the TV screen, are connected by a series of transporters which propel you backwards and forwards between the different scenarios — but each transporter can only be used once. Each level has its own characteristics: brave the meteor storms at the planetary surface; entice the haunting spirits into their cages by strategically positioning the boulders; avoid the eerie skulls of past explorers; unlock the safes with hidden keys; and crush the fearsome monsters which hatch from giant eggs. Can **you** complete REPTON 2?

ACORN ELECTRON

BBC MICRO

## MORE PRIZES!

Complete REPTON 2 and enter our competition. The first 100 winning entrants will each receive a beautifully designed "I'VE COMPLETED REPTON 2" cotton T-shirt; all correct entries received before 31st March 1986 will be eligible for the cash prize of **£200**

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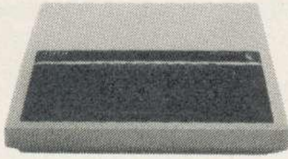
**SUPERIOR SOFTWARE LTD.**
Dept. AU12, Regent House,
Skinner Lane, Leeds 7.
Tel: 0532 459453.

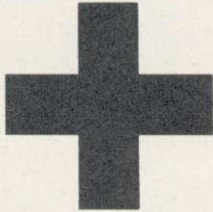



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The BBC B+ has 64K of Memory, expandable to 128K, a built in Disk Interface, two extra ROM Expansion Sockets, and additional Disk and ROM Management Commands. The B+ is, therefore, a significant improvement over your curmnt BBC B.

By taking advantage of this offer, you can be sure that your system remains 100% compatable with Acorn's Software and Peripherals, and that there are no fiddly 'piggy-back' boards or 'flying leads' to degrade reliability.

See the table opposite for details on how much you can expect to pay for this upgrade.

This offer means that Compshop has a number of second hand BBC's for sale, both with and without Disk Interface, all with new cases, power supplies and keyboards, and all with 3 months warranty.

If you want a BBC but can't afford a new one, phone us for prices and availability of second hand stock.

### DETAILS OF YOUR MACHINE

| | MORE THAN TWO YEARS OLD | TWO OR LESS YEARS OLD |
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| WITHOUT ACORN DISK INTERFACE | £225 | £150 |
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- FULL DOCUMENTATION

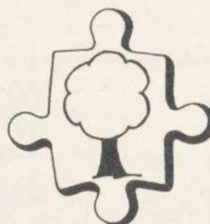
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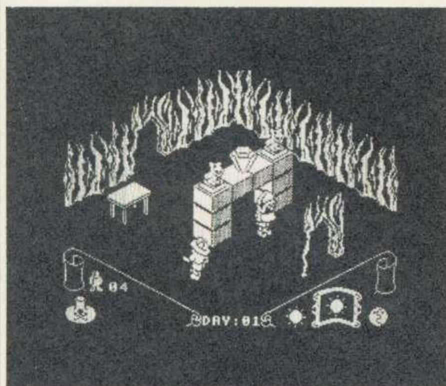
# CHARTS

**Check out the latest position of your favourite game**

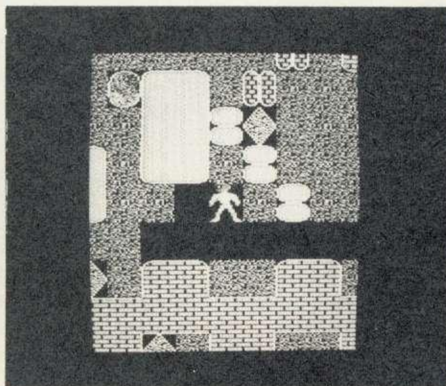
## TOP 20 BBC MICRO GAMES

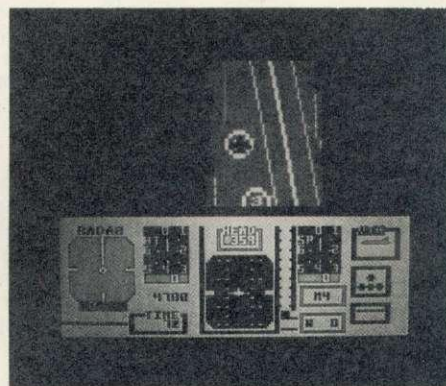
| | Title | Publisher | Cassette | Disc | Reviewed |
|---|---|---|---|---|---|
| 1 (1) | Match Day | Ocean | £9.95 | – | January '86 |
| 2 (2) | Beach-Head | Access/US Gold | £9.95 | – | December '85 |
| 3 (4) | Combat Lynx | Durrell | £8.95 | – | September '85 |
| 4 (3) | Revs | Acornsoft | £14.95 | £17.95 | July '85 |
| 5 (14) | Jump Jet | Anirog | £9.95 | £11.95 | January '86 |
| 6 (–) | Bored of the Rings | Silversoft | £6.95 | – | |
| 7 (5) | Elite | Acornsoft | £14.95 | £17.95 | October '85 |
| 8 (7) | Alien 8 | Ultimate | £9.95 | – | |
| 9 (9) | Atic Atac | Ultimate | £7.95 | – | |
| 10 (8) | Repton | Superior | £9.95 | £11.95 | September '85 |
| 11 (6) | Knight Lore | Ultimate | £9.95 | – | November '85 |
| 12 (11) | Scrabble | Leisure Genius | £12.95 | £14.95 | July '85 |
| 13 (–) | Terrormolinos | Melbourne House | £7.95 | – | |
| 14 (15) | Death Star | Superior | £9.95 | £11.95 | January '86 |
| 15 (10) | Brian Jacks Superstar Challenge | Martech | £7.95 | – | August '85 |
| 16 (16) | Wizadore | Imagine | £7.95 | – | August '85 |
| 17 (20) | Castle Quest | Micro Power | £12.95 | £14.95 | March '85 |
| 18 (13) | Hobbit | Melbourne House | £14.95 | £17.95 | December '85 |
| 19 (12) | Red Moon | Level 9 | £6.95 | – | |
| 20 (–) | Monopoly | Leisure Genius | £12.95 | £14.95 | |

COMPILED BY GALLUP/MICROSCOPE



Knight Lore: blazing on the Beeb at no. 11


Repton: occupying the middle slots



Jump Jet: flying up both charts

## TOP 10 ELECTRON GAMES

| | Title | Publisher | Cassette | Reviewed |
|---|---|---|---|---|
| 1 (1) | Beach-Head | Access/US Gold | £8.95 | December '85 |
| 2 (2) | Elite | Acornsoft | £12.95 | October '84 |
| 3 (6) | Bird Strike | Firebird | £1.99 | June '85 |
| 4 (–) | Jump Jet | Anirog | £9.95 | January '86 |
| 5 (–) | Death Star | Superior | £9.95 | January'86 |
| 6 (5) | Repton | Superior | £9.95 | September '85 |
| 7 (–) | Arcadians | Acornsoft | £6.99 | |
| 8 (–) | Jet Power Jack | Micro Power | £2.50 | July '84 |
| 9 (–) | Galactic Commander | Micro Power | £2.50 | |
| 10 (–) | Danger UXB | Micro Power | £2.50 | |

COMPILED BY GALLUP/MICROSCOPE

# BETASOFT

## War Games and Educational Programs

**TELED – the Teletext screen editor – for those who believe the BBC is more than just a games machine.**

Design your own text and graphics screens quickly and easily using more that 40 functions available at the touch of a key. Save them to disc, or print them out.

**TELED is:**

**POWERFUL.** Machine code routines give you instant access to many types of lines and boxes: circles and ellipses: rapid full-in of even the most complex shapes: copying of graphics blocks: storage of lines in memory: saving and reloading of screens, and a screen dump with positive or negative image options.

**USER FRIENDLY.** Instructions and reference pages can be called up on the screen during editing: the printed keyslips provides instant reference to the functions available; and a "painless introduction" booklet will show you step by step how to produce a sample screen.

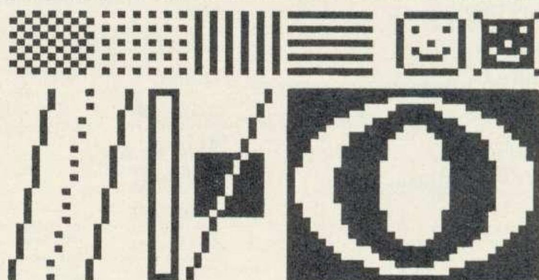
**VERSATILE.** You will then be ready to move on to create your own designs for all kinds of applications: title and display pages for projects; locations for adventure games; more attractive layouts for your own programs, etc.

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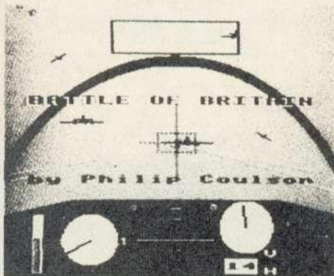
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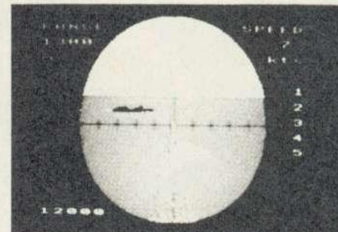
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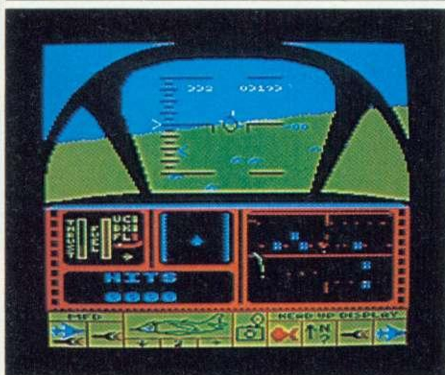
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# REVIEWS

## SOFTWARE

### BATTLE OF THE HARRIER JUMP JETS



**'Strike Force Harrier', Mirrorsoft, BBC B and Electron, £9.95, £12.95 (disc)**
**'Jump Jet', Anirog, BBC B and Electron, £9.95, £12.95 (disc)**

Two new simulation games have the world's best proven combat aircraft at their centres – the Harrier Jump Jet. Both will run on the BBC micro and Electron.

Mirrorsoft's *Strike Force Harrier* (pictured above) puts you in the cockpit of the jump jet with an arsenal of cannons, bombs and side-winder missiles. You have the choice of practice level or combat level as well as with three skill levels.

The screen display is neat – speed, height, pitch and compass headings are displayed on the cockpit hub. Below this is a small multi-function display; the FORTRAC map/radar; a message screen and the head up display.

Playing the game is straightforward – just bomb the enemy HQ. Control is via the keyboard although the joystick option allows you to 'fly' in a more conventional manner. Flying the aircraft is reasonably easy to master; the FORTRAC shows you where you are, where you're going and what's below you.

Once you pass the 10,000ft mark you pass through the cloud into clear blue skies with amusing wisps of cirrus here and there.

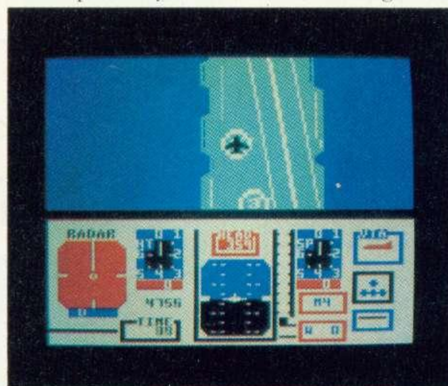
Combat is interesting, and the manual – albeit a bit short – details the various encounter tactics available to you. It fails to tell you actually how to fire anything though! It was only after some head-scratching that I found the word 'trigger' on the space bar on the map of the keyboard.

Some nice touches allow the pilot (you) to black out (the screen goes black!) or suffer from blood rushing to the head (the screen goes red!) – so watch how steep you climb or how fast you descend!

While the cockpit display is quite good, the out-of-the-window graphics leave a little bit to be desired, with no real detail at all. I have yet to see a missile at any time other than on the air attack radar. Apart from these inadequacies the game is both hard and interesting to play and, all in all, worth the asking price.

The second offering comes from Anirog, it's called *Jump Jet* (see screenshot below), and the home base is an aircraft carrier.

The cockpit display is not as realistic as *Strike Force Harrier's* but it's passable. At the start you get a bird's eye view of the jet on the carrier launch pad. As you reach 50ft this changes to a



dual display showing the side and rear views of the carrier with the jet above it. A little higher and you have an out of the cockpit display which is slightly better than the previous game's.

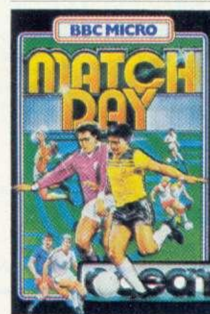
The only real problem I had in getting to grips with this version were the instructions. It's only after reading five pages I found it is a joysticks only game, a page before the loading instructions! Flying and manoeuvring are difficult and you are penalised for each mistake you make. You're allowed nine errors after which it's back to the launch pad.

To obtain one of the five ranks you must successfully complete the selected mission. Each rank comes with more adverse weather conditions – which makes controlling the jet difficult – plus extra enemy aircraft to destroy.

*Jump Jet* offers a little more in terms of difficulty, however Mirrorsoft's game is a bit more realistic and scores slightly higher overall.

**Bruce Smith**

### THE ROAR OF THE CROWD




**Match Day, Ocean, BBC B and B+, £9.95**

At the beginning of this football game, the menu screen gives various options – you can pit your wits against the micro or play against someone else. There's also a choice of keyboard with default keys or user defined ones, or you can use joysticks.

The big day arrives to the music of *Match of the Day* (at least I think it is – I can't remember that far back), and at the kick off you have to make your first choice – I kick to my inside right (joystick right and fire), but the ball's flying off the pitch because I forgot to put the joystick down.

It's a throw in for the opposition and the ball lands in the space where I can't get my men. It's a fix, ref! The other team scores to a roar from the crowd – well, the speaker crackles and the screen goes dark.

Back to the centre circle – practice makes perfect! My men seem to have minds of their own and control is given to them when the ball gets close.

Now the opposition's got the ball again, so I try a tackle – but the two players merge together (graphically speaking). Separated again, the other side's got the ball still, he passes and I manage to intercept. Dribbling down the wing, my opponent's man merges into mine again and, of course, emerges from the tackle with the ball.

His attack reaches a position to shoot, he does so; unfortunately my goalkeeper dives the wrong way, and me and the speaker crackle and hiss.

I'm sorry to say that I didn't manage to win or even score a goal against the micro – it would have been nice to say 'I'm over the moon, Brian', but who could do so when the last game finished with a goal kick and my man taking it kept running into the side netting, into the side netting, into the side netting . . .

**Tony Wade**

# REVIEWS

## SOFTWARE

### TALKING TO YOURSELF




**'Talkback', Acornsoft, BBC B and B+, £9.95, £11.50 (disc), £6.99 (Electron)**

This menu-driven program enables you to create computer 'characters', save them to disc or tape, make them hold conversations with each other or with yourself, and up to two characters can be in memory at once.

There are three ways you can inject some personality into your characters: starters, keywords and responses. Each character must have at least one starter and may have up to four. Starters are used randomly by characters to initiate a conversation or as a fallback utterance if no keyword has yet been recognised in the course of the conversation. A typical starter might be 'Nice to see you again'.

Keywords and their responses are where the fun starts. A character may have up to 42 keywords which it recognises and responds to (121 if a second processor is attached), and keywords can have more than one response allocated to them. Thus the keyword 'Knightsbridge' might trigger off 'This is the Knightsbridge Double Glazing Emporium' or 'Mr Jones at your service'.

In addition, keywords can be flagged with an asterisk. These 'stems', as they are referred to, enable the final part of one character's response to be repeated as the final part of another character's answer. Thus, if you flag the keyword 'they say' with the response 'What do you mean' and make it a stem, a character saying something like 'They say love makes the world go round' will get the reply, 'What do you mean, they say love makes the world go round.' Stems also replace words such as 'you', 'are' and 'I've' with 'me', 'am', 'you're', etc.

As with all computer-generated conversation, it's not difficult to fool the machine into spouting nonsense. Also, conversations tend to be extremely elliptical with characters always talking at cross purposes.

The (generally excellent) manual somewhat tackily suggests you set up dialogues between a car and a horse, or the new year showing the old one out. For realism, therefore, you should create a pair of characters whom you wouldn't expect to listen too closely to each other. I showed the program to a non-computer literate friend who had fun creating a conversation between 'Scargie' and 'Thatch' (characters' names cannot be longer than seven letters) as well as devising a character with a nice line in selling life insurance. **Simon Dally**

### CRYSTAL CLEAR




**'Death Star', Superior, BBC B and Electron, £9.95, £11.95 (disc)**

This is a well thought out arcade game with all-round screen scrolling. On loading, the frightening 'Deathmask' of the Deathstar appears as the title screen – but nothing else exciting happens.

A high score was easy to achieve at the first level, but then there was a flash of colour, the Deathstar appeared and I disappeared. Here comes the catch – you also have to contend with workers, warriors, crystal mining and manoeuvring your ship to collect the crystals.

To move the ship you can rotate clockwise or anticlockwise – my advice is to point the ship in any direction, fire and pick up crystals. The workers gather stray crystals and the warriors mine them – although I didn't find much evidence of this activity. The warriors can kill you, and when they do it's difficult to discover why.

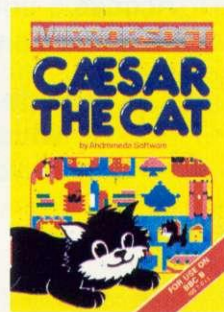
The screen comprises two areas, the battle screen and the radar screen. The latter seems to serve no useful purpose in the early stages, but as you progress through the zones, increasingly fewer 'Planetoids' are present and so some searching is necessary.

The Planetoids are important because this is where you mine your crystals, and if you keep bashing against the Planetoid and firing you can pick up more of them, otherwise they zoom off into space where a worker will collect them.

When the enemy picks up a crystal the Deathstar begins to take shape; when you do so, you get a Starbomb. Once both sides have 24 crystals, the Deathstar's complete. If you drop your Starbombs and destroy the Deathstar you get 15,000 points.

This is probably one of the better arcade games in terms of graphics, but very poor in the field of sound. **Tony Wade**

### CAT IN THE CUPBOARD




**'Caesar the Cat', Mirrorsoft, BBC B £6.95, £9.95 (disc)**

This is a BBC micro version of the popular game about the cat looking for mice in the larder. The cassette comes in simple but effective packaging with loading instructions. There is a catchy collection of background music which is a very effective cue. Thankfully, this can be adjusted to an acceptable level.

Caesar's job is to catch the mice who are eating the food on the larder shelves. When a mouse is captured, a door opens on one of the shelves so that Caesar can take the mouse outside. Points are scored for each mouse, but points are lost if Caesar knocks crockery off the shelves. The score is also reduced by the mice nibbling away at the food, or if Caesar crashes into the walls. When 10 mice have been removed, the pace increases and scores increase for the next 10.

There is a constant reminder of the current score on screen, as well as the highest score in the current session. In all there are 10 levels of difficulty.

The graphics are very good, yet simple. The mice nibble convincingly and Caesar creeps stealthily along the shelves, as well as doing cat-like leaps. The game appeals to young and old alike, and is certainly addictive – you can play it for hours.

My one complaint is the lack of loading instructions for the disc user. It seems, yet again, that if you own a disc drive you should not need to be told to *DISC before loading. With so many Beebs now fitted with a disc interface, this is a small but important omission.

If you are fed up with zapping aliens, this could be a good buy at £6.95, and it will keep the children quiet for hours. **Frank Jones**

# REVIEWS

## BOOKS

### MASTERING YOUR OWN DESTINY




**'Mastering the Electron', by Simon and John Matthews, Ellis Horwood Ltd, £5.95**

Books written by academics usually have the advantage of being accurate, detailed and precise; they can also be dry, boring and pedantic. This one, fortunately, has all the advantages and suffers from none of the disadvantages of an educated authorship.

And for once the publisher's blurb gets it right: the claim that 'The language, graphics, sound and other features of the Electron are highlighted and covered in a clear, concise manner' turns out to be true. The readership is broadly defined as 'All teachers and pupils of computing in schools, and all those who have access to an Electron microcomputer'. That's pretty comprehensive but, once more, it would seem to be no more than the truth.

The book begins with an anecdote to illustrate the point that proper instruction and tutoring are essential for mastering programming techniques. The emphasis from there on is not simply to teach but to master programming, through speed, efficiency, comprehensibility, adaptability, and the knowledge of how to get the best results out of the computer.

Once they get going, the authors move rapidly; topics covered include binary numbers, integers and real numbers, strings, Boolean values, passing information to and from programs, some of the special features of BBC Basic, the VDU and *FX commands, the programmable keys . . . and that's just in Chapter 1!

Chapter 2 moves into graphics programming methods, and includes a longish (2810-line) character design utility. Chapter 3 is concerned with the use of procedures and functions, illustrated by a 2380-line version of *Yahtzee* – followed, appropriately, by a section on debugging!

Sound is the subject of Chapter 4, and it's nice to see a clear admission here that the Electron's sound facilities aren't all that good.

The next chapter deals with efficiency, starting with methods for compressing programs (at the expense of readability, and the possible introduction of errors), moving on to go-faster techniques. Chapter 6 covers cassette storage and file handling.

Chapters 7 and 8 are on machine code, assembly language programming and 'hooks' into the operating system. One of my New Year resolutions is to read more thoroughly the sections on structured m/c programming!

Chapter 9, on hardware and interfacing, contains enough information to get a reader started tinkering with simple add-on circuits. Useful constructions (full layouts are given) include a very simple switched joystick made from everyday materials, an input/output port, a Centronics printer interface and a proportional joystick controller; operating software is listed for all projects.

Lastly, one of the appendices gives a listing for a 6502 disassembler, but best of all there is a truly comprehensive index – probably the best I've seen in a book of this style. With an index as good as this it's dead easy to refresh the parts you've forgotten – the parts other books can't reach!

This quick summary gives only a hint of the full content of *Mastering the Electron*. The explanations are generally clear but, inevitably, some topics are less well covered than others and some points fall between the cracks, due to the tremendous scope and pace of the book.

The authors' knowledge and expertise is obvious in every line, but they don't rub the reader's nose in it. Their advice and methods should be recommended reading for any student of the art; and anyone who works carefully through this book will be a master not just of the Electron, but of programming generally. **Ron Keeley**

### ADVANCE TO JOE

**'BBC Micro Advanced Programming', Joe Telford, Prentice Hall International, £9.95**

Joe Telford will need little introduction to regular readers of *Acorn User*. I'm pleased to be able to say that this book maintains the excellent standard of his regular articles for this magazine, providing clear and concise coverage of a wide range of programming techniques for the BBC micro.

The book is intended for programmers already familiar with the main features of BBC Basic, and aims to take readers to the stage of being able to write good quality, robust programs of real practical use. Almost 400 pages long, it is packed with useful information and advice. The early chapters cover program design, starting with a clear and convincing explanation of the need for structured programming. This is followed by brief coverage of the main programming structures offered by BBC Basic. The main body of the text is then dedicated to a series of chapters covering specific programming techniques, ranging from data structures and filing systems through to sound, graphics, and use of peripheral devices such as the user port, printer port, and RS423 interface. One chapter is devoted to 'BBC logic', explaining binary and hexadecimal number systems and the way these are used for internal storage of information within the BBC micro, while the final chapter introduces assembly language programming.

The book provides numerous short but valuable routines which illustrate specific points in the text. Many of these are designed for use as part of a library of general-purpose procedures and functions.

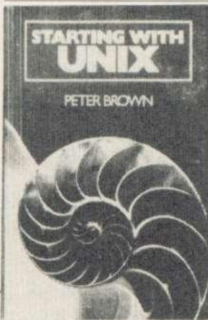
By necessity, the coverage given to such matters as graphics and sound falls short of the treatment offered by books which are dedicated to these topics alone. These chapters are intended to give a working knowledge of their subjects, and to lead on to the use of more advanced texts if required. This is not to say that the content of the book is in any way superficial, however, and most of the main chapters stand on their own merit and will be of use to even the most experienced programmer for reference purposes. The chapter on filing techniques, for instance, includes a thorough explanation of random access disc filing, and presents all the routines needed to form the basis of a sophisticated database. The same chapter also gives a full description of the use of disc workspace, and shows how directory information can be read in an automatic disc menu program. Sections covering data structures and data processing also stand out.

This is a book which should be of interest to readers over a wide range of programming abilities. It will be of most value in helping inexperienced programmers to master the full range of facilities available on the BBC micro, and as such is an excellent 'follow-on' from one of the many introductory texts on BBC Basic. More experienced programmers should also benefit from the advice offered on program design and technique, and will find it of continuing value. **Peter Sandford**

# REVIEWS

## BOOKS

### THE APPLIANCE OF SCIENCE




**'Starting with Unix', Peter Brown, Addison-Wesley, £7.95.**

Just occasionally, you come across a book which communicates such enthusiasm for its topic that you cannot wait to get involved yourself. It seemed unlikely that such a book could ever be written about a computer system, yet Peter Brown has succeeded in making Unix compulsive.

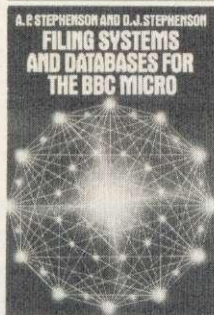
Many Acorn users might well ask what relevance Unix has to them. Few will own a Torch Unicorn system or have access to Unix at all. To teachers suffering the frustrations of cassette-based machines it is a pertinent question. But Unix is a frequent topic in the current trade press, and for a brief description of what it is and what it can do I would point readers to the review of the Torch system by Andrew Cummings and Peter Voke in the September 1984 *Acorn User*. Cummings and Voke suggest that: 'In 10 years' time the megabyte micros we all hope to have will almost certainly provide Unix or a descendant of it.'

If they are right, then anyone wishing to keep up to date and prepare for the future ought to know about Unix.

In *Starting with Unix*, a number of amusing themes run through the book. For example, editing is illustrated by manipulating text from the author's new novel in which the hero, Greg Daimler, later renamed Cyril, finds 10 (or is it 17?) bodies stuck to the ceiling. The mail system is used to send invitations to fellow Unix-user Anne, but she callously erases our advances while saving those from another user, Dudley Detail, in a file called 'treasure'. We get our own back by fixing Dudley's directory to give the impression that all his files have been deleted, and we are able to do this because of our expert understanding of the Unix system structure. Dudley Detail is in fact the villain of the book who frequently interrupts to remind the author that he has omitted to mention the further 17 options to such and such a command, but fortunately Dudley is silenced before he can list them.

Unix of course is not a computer game, and *Starting with Unix* is not a frivolous book. It's well written and its level is just right for the beginner, covering all one needs to know without going into too much detail. Part 1 gives a grounding in the concepts and ideas behind Unix in terms that can be understood by anyone with only the briefest experience of computers. In part 2 these ideas are applied, and chapters include the shell commands, editing the C language, documentation and communication; in fact everything one needs to get started. I found this an informative, readable book and a very enjoyable way to learn Unix. **Robert Ward**

### BASE DATA ON DATABASES




**'Filing Systems and Databases for the BBC Micro', A P Stephenson and D J Stephenson, Granada, £7.95**

What is a database? What is a filing system? What is the difference between a sequential file and a serial file? Is 'direct access' the same as 'random access'?

If you are looking for answers to these or other questions regarding database or file management systems . . . my advice is to look elsewhere. These subjects are not all that complicated yet the authors of this little work make them seem very intricate indeed.

The warning signs appear, as they often do, in the authors' own preface where they go on at length about the distinction between a database and a filing system without attempting to explain the difference (in the simplest terms, a filing system is the box in which you keep the accumulated telephone bills of the past 10 years, whereas a database is your address and telephone book).

They conclude by saying 'this book has tried to avoid hair-splitting arguments. Those readers who have a leaning towards academic purity and who may dispute some of our terms are advised to consult a well-stocked library. They do, of course, run the risk of being even more confused than we were!'

Really, this is appalling stuff. Apart from the gratuitous slur on academics everywhere, the authors ought to be aware that a feeling for the niceties of terminology is not academic in any sense, but a sign of careful thought, preparation and good writing.

We don't want to know that the authors were confused; we hope only that they have sorted themselves out to the point where they can explain it to us in reasonably clear, concise language. Unfortunately, they haven't . . . because they don't. **Ron Keeley**

### STARTING WITH ENTHUSIASM

**Wordwise Application Guide, Paul Beverley, Norwich Computer Services.**

This book consists of a series of hints and tips for users of *Wordwise*, and an accompanying disc of programs is available. The quality of the tips is variable – there are a couple of gems but most are not very useful, even to the novice 'Wordwiser'. The style is friendly rather than academic, but still long-winded.

One or two bits are very helpful. There are excellent diagrams explaining the page layouts of *Wordwise*, and you'll find some good advice in the introductory chapters, although they are difficult to read.

A number of Basic and assembler programs are included, which are useful and well written. In particular the routines for the Brother HR1 daisywheel printer (eg, underline) would be invaluable to anybody using an HR1 with or without *Wordwise*. The *Wordwise* multi-copy print routine works well.

Unfortunately many of the techniques presented either do nothing useful or are inefficient ways of tackling the problems. I doubt that many people will find *Wordwise* particularly useful for 'knitting patterns' or 'database applications'! Many of the Basic routines only work in Basic 2, but simple changes would have enabled them to work in both versions of the language.

The appendices are mostly good, especially the table of *key codes, and there are notes from Computer Concepts explaining the differences in the latest version of *Wordwise* 1.20.

Overall I was disappointed, and could not recommend this book except for the HR1 printer routines and some of the initial explanations. The content is really at the level of a magazine article rather than a book, and with only 52 pages of quite large text it's not very long, anyway. If you've upgraded to *Wordwise Plus* then many of the tips in this book are not at all applicable. **Patrick Quick**

# REVIEWS

## HARDWARE

# THE GENTLE TOUCH

**Simon Williams gets his hands on the Cumana Touch Pad**

Time was when the idea of typing information into a computer letter by letter was considered a luxury. Real men not only spurned quiche, but put characters into their machines in hex. Then there were membrane keyboards, which at least looked the part, even if you needed slender fingers and the touch of a rhino to make effective contact.

Then came the BBC micro (and the Atom, for that matter), with a very passable attempt at a 'proper' electronic typewriter keyboard to make us all happy. And so we would have remained if it had not been for the inventiveness of peripheral suppliers. 'The keyboard is defunct', they claimed. 'What you really need is a light pen/digital tracer/joystick/mouse.' The latest in a line of these peripherals is the Touch Pad from Cumana (£69.95).

The Touch Pad is a cross between the large scale Concept Keyboard (see *Acorn User*, May 1985), and a digital tracker. The package consists of the pad housing itself, which is about 5in wide by 7in deep, a solid black plastic stylus, a cassette of software, and an instruction manual.

The pad connects to the RS423 port at the back of the Beeb and to the auxiliary power outlet normally reserved for disc drives. If you are already powering your discs from the computer, Cumana provides an extension socket so that both can be connected at once. You should take great care not to overload the supply, though, particularly if you are using dual drives.

Making the right connections is very straightforward, as there is only one plug at the Touch Pad end, which connects into a socket on the back of the pad.

The front face of the wedge-shaped pad contains the pressure-sensitive pad itself, two buttons marked with an up and a down arrow, light emitting diodes (LEDs) to indicate 'power on' and 'pen down', and an inkwell hole in the top right-hand corner to hold the stylus. If you press the pad with the stylus, the 'pen down' LED lights up when you're pressing hard enough for the stylus to be sensed.

The manual supplied with the pad is reasonably comprehensive and supplies details of the signals the pad provides so that you can make use of them within your own programs. It would be useful to have an annotated listing of the pad software, however, so that you can learn from it, or adapt it to your own needs.

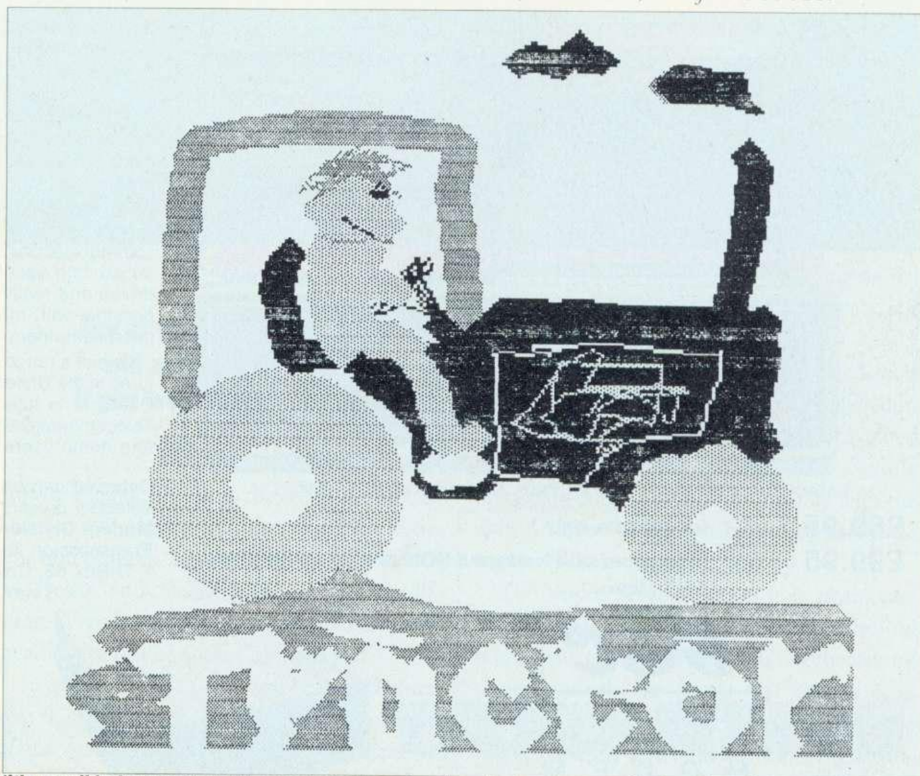
The software itself consists of a simple graphics program, of the type often supplied with light pens. You are shown an area of a mode 1 screen, with a strip of colours down the right-hand side and a menu of facilities to the left. The currently-selected option from the menu is shown in inverse video and a diamond-shaped cursor flashes in the main drawing area. To make a selection from the menu you run the stylus down the left-hand edge of the pad. The selection you are making is highlighed in yellow. You confirm your choice by pressing the 'pen down' button (the top button of the two to the left of the pad). It is disappointing that this technique of using stylus and button is an integral part of the system, as it means the Touch Pad must be operated with both hands – this isn't necessary with a light pen or mouse.

There are several modes of drawing on the Touch Pad. One of the simplest draws a line freehand as you move the stylus about the pad. A 'fatter' version of this, called 'brush', is also the main way of filling areas with colour. There is no colour-fill routine built into the software, but you can set up 'open' or 'filled' rectangles and circles. Another option, 'rays', draws lines from a pre-set centre to the current position of the stylus as you manoeuvre it. There is no way of changing the selected colours (black, red, yellow and white) from within the program, which you may find restricting, and you have to press quite firmly to maintain contact with the pad.

The Touch Pad is a great leveller. If you look at the illustration accompanying this review, you will see that it's possible for people of all ages to produce drawings that are apparently done by a five year-old.

Once you have played around with the drawing program, which is a fun way to spend several evenings, you begin to wonder what uses the Touch Pad can actually be put to. It certainly has the resolution to be used in similar applications to a mouse, but the two-handed operation means it is easier to use a keyboard or joystick. I rather suspect that Cumana has hit on a solution which, as yet, has no suitable problem to solve.

*Touch Pad, £69.95, Cumana, Pines Trading Estate, Broad Street, Guildford GU3 3BH*




**'It's possible for people of all ages to produce drawings that are apparently done by a five-year-old'**

HARDWARE

# PADDING ABOUT

**There's a surprising variety among numeric keypads says Simon Williams**




PHOTOGRAPH BY ROGER PHILLIPS

As time goes on, more and more manufacturers produce peripherals for the BBC micro, and one obvious area for sales is the 'useful facilities' not already available. The three companies whose products are reviewed here have brought out 16-key numeric keypads which connect to the main machine by ribbon cables. All the pads include the numbers '0' to '9', but each chooses a different six characters for the remaining keys.

You wouldn't think there could be a lot of variety among keypads, but in fact each of the three products reviewed approaches its task in a different way.

The Softlife Numeric Keypad is housed in a white plastic box – the sort often supplied for DIY electronic projects – overprinted with the

**Any of the three keypads will make life easier if you work with numbers**

Softlife legend. Inset into the top cover are the 16 keys, with the keytops also in white plastic. The non-numeric keys, which are '.' 'E' 'Enter' '–' 'Delete' and 'Delete Line', are slightly off-white. The overall effect is rather suave, if such an adjective can be applied to a keypad.

In use the keypad proved to be less comfortable than the others, largely due to the height of the case. You have to hold your hand in mid-air while using the keys, which is tiring over a prolonged period. The springing on the keys is a little stiffer than the BBC micro's, but not awkwardly so.

Inside, the key switches are mounted on a neatly-designed circuit board with some additional circuitry, and the whole board is glued into the bottom half of the case. Softlife obviously doesn't expect any trouble with the unit. A ribbon cable connects the keypad to the user port of the BBC micro.

The Viglen Keypad comes in a cream case which looks to be custom-designed for the job. It is a similar height to the Beeb's keyboard and slopes towards the front. The case is deep enough to support the heel of your hand while you're using it, which makes it more comfortable than either of the other units. The keys are

black, and designed for assembler programming, as the extra six are labelled A to F.

For an extra £10 you can buy the keypad with keytops you can alter the legends on, but even the basic unit comes with labels to stick over them.

The keys have a lighter feel than those of the other units, and are more akin to the action of the BBC micro itself.

The circuitry inside the case, which includes RAM to hold the look-up table for key definitions (see the section on software), is housed on a separate Printed Circuit Board from the key switches. The whole thing is mounted on machined blocks of perspex. It looks and feels very solid.

**Each of the three products reviewed approaches its task in a different way**

The ribbon cable, which in this case connects into the 1MHz bus, is clamped on to the main keypad circuit board, but is fed out between the top and bottom of the case and is trapped between the two – not an ideal technique. The cable has a daisy-chain socket on it, so you can connect other devices to the 1MHz port at the same time as the pad. To power the keypad's circuitry, a separate lead is taken to the outlet on the power supply of the BBC micro.

If you're running a disc drive from this outlet, you can reconnect it to an identical outlet on the back of the keypad. The instruction manual assures you that the keypad consumes very little current.

The Voltmace Datapad 16b is housed in a plastic-faced metal case and has a set of brown keys in the centre of its sloping top. This is the only keypad to provide a centring 'pip' on the '5' key, which makes it easier to use the number keys while keeping your eyes on the monitor screen.

Although the case forms a reasonable apron around the keys, it is not quite long enough to rest your hand on. The extra key symbols on the Datapad's keys are '.' '=' '/' '×' '+' and '-', and the actions of the keys are similar to those of the Softlife keypad. This is hardly surprising, when you realise they both use the same keyswitches.

Inside, the circuitry is housed on the same board as the switches, and the ribbon cable to the user port is led out through a rectangular grommet in the back of the case.

## Software

The construction of the keypads is one aspect of their overall usefulness. The other is the software which is used to drive them. All the pads are programmable, which means you can define their keys to reproduce any key on the BBC micro's keyboard, and in some cases other codes as well.

Softlife and Viglen provide controlling software in EPROM chips, while Voltmace supplies a tape, and instructions for transferring the programs to disc.

All three pieces of software will program their keypads effectively, but with varying degrees of ease.

Softlife's chip contains two utilities. The first, called by *PAD, sets up the pad to produce the characters shown on the key tops. This worked well, once I had discovered that my AMX Mouse ROM was still under the impression that a mouse was attached to the user port. Repositioning the pad ROM in a higher priority socket cured the problem, except that the 'Delete Line' key would only produce 'F' on the screen.

The other utility, which is loaded from the ROM filing system by typing *ROM <RETURN> CH."MAKEKEY" <RETURN>, is a Basic routine to produce a machine-code driver with your own key assignments on it. You redefine the keys on the pad by selecting them on a screen display and pressing the required key on the Beeb's keyboard. The code is relocatable, may be stored on tape, disc or EPROM, and called with a *RUN command.

**You wouldn't think there could be a lot of variety among keypads**

The Viglen software adds extra star commands to your micro, and is the easiest to use. *PAD turns the keypad on, with the default characters as marked on the keys. *NOPAD turns it off again.

*DEFKEY will define any of the keypad's keys, and you can use a single character, a string or a control sequence, in much the same way as defining the red function keys. *SKEYS and *LKEYS will save and reload your definitions, and they are held in the pad's own RAM, so you don't need to worry about conflicts with other software. Finally, the *TEST command will check any other peripheral plugged into the 1MHz bus along with the keypad, and tell you whether the two are compatible. All the star commands can be preceded with a 'V', to guard against conflicts with other ROMs in your micro.

**Ease of use must play a big part in your final decision**

The routines supplied by Voltmace fall into two categories. The main definition program is easy to use and allows you to define auto-repeat and auto-beep for your completed set, although I couldn't get the auto-beep to work on my system. The driver works by enabling event 4. The key assignments may again be saved on disc, and relocated.

The other utility is a set of three routines, which will relocate the machine-code driver, show you how to run it with the 6502 second processor and allow you to patch an existing driver by poking memory locations. It's probably quicker to reprogram the pad from scratch.

## Conclusion

Any of the three keypads will make life easier for you if you work with numbers. If you're computing on a budget, then the Voltmace Datapad 16b is a good robust product which should serve you well. For an extra £30, Viglen's keypad is an ergonomically sound unit with the added advantage of leaving your micro's RAM untouched. The Softlife pad suffers from the shape of its case, and a comparatively high price. If you're going to spend money specifically on an extra keyboard, then ease of use must play a big part in your final decision.

**Softlife Numeric Keypad, £69.25**
Softlife, 7 Rose Crescent, Cambridge CB2 3LL. Tel: (0223) 62117

**Viglen Keypad, £69.95**
Viglen Computer Supplies, Unit 7, Trumpers Way, Hanwell W7 2QA. Tel: 01-843 9903

**Voltmace Datapad 16b, £39.95**
Voltmace, Park Drive, Baldock, Herts SG7 6EW. Tel: (0462) 894410

HARDWARE

# OUTSIDE BROADCAST

**Trevor Buck tunes himself into the Morley Teletext Adaptor and downloads his review**

The Morley Teletext Adaptor can capture teletext information and software broadcast by the BBC (Ceefax) and ITV (Oracle) through a standard television aerial and display them on an ordinary TV set. The advantage over teletext by phone is that, once you've bought the hardware, the software comes free and there is no subscription charge.

Acorn already has a device to do just this which I have used for some time, but it costs £149 and is unable to take advantage of changes being made to teletext broadcasting – which the Morley device can. The newer adaptor comes with ROM chip software and manual just like the Acorn one, but goes about its task in a very different way.

The instructions to install the ROM are clear and I had the whole thing put back together and all plugged-in in under three minutes. Unlike the Acorn system, which uses the 1MHz bus and creates an alternative filing system, the Morley unit plugs into the user port and works from within the current filing system.

Now if, like me, you try out new goodies by giving what seem to be logical commands, and seeing how far you can get before you have to resort to the manual, this adaptor is for you.

I was unsure how well I would get on at first, as there is a message to remind you that the system has not been fed with its required TV channel data on power up. Not to be outdone I went ahead with *TTEXT and was rewarded with the working page tuned in to BBC1 Ceefax. The people at Morley have built-in a set of default channel data while the unit is under development, and this just happened to be the same as those channels for my area.

In order to tune the unit in all you have to do is type *TUNE and a Basic program is run to tune the unit to the channels. Full instructions on how to use it for fine turning are given in the manual, and it took me less than three minutes to find all four channels. All the controls are on the keyboard.

The channel tuning data is saved onto disc in a file called 'channel' and reloaded by the command *CHANNEL. Every time you turn on you can run a !BOOT file to do *CHANNEL and *TTEXT for you.

The unit tunes into the default page of 100 on BBC1, and the teletext page is displayed by pressing Tab. Escape takes you back to the working page. The on-screen menu gives you the options to save a screen to disc, catalogue software, download software, toggle reveal on/off, toggle hold on/off, and select a new channel (1-4). They are entered by a single key press, with no need to press Return or select an option via the function keys.




**Download software for free**

Like a TV set with teletext, all you do is key in the three digit number of the page you want and wait for it to be broadcast. You can select a new page from either the working page or the current page displayed.

Using the 'N' key prompts for the channel in the bottom right box on the working page, and you must type in a number from 1 to 4. The 'page header' information changes to show that you are now on the desired channel.

Reveal and Hold have their current status displayed on the working pages, and when used with a displayed page their on/off status is flashed up at the bottom of the screen.

To save a screen to disc is simple – just select the page number you want and press 'S'. The system prompts for a filename and then saves the screen to disc. These screen images can then be *LOADED as and when required.

However, for most people the main attraction will be accessing the software. Pressing the 'C' key puts the unit into display mode for BBC1 page 701, where *CAT is found (a list of the current software available).

The Download command also accesses page 701 and includes an extra line prompting for the page number of the program you want to download. Each page is stored so as to form a complete program, and you are given a choice of saving this to disc or running it in Basic.

The unit comes with full error checking, and when errors occur it will try to correct these on the next transmission of the block. At the time of writing the blocks change every 20 seconds or so, and the unit will keep going until it has downloaded the software or you give up.

One of its nice touches is that, instead of just 'Searching . . .' over and over again, it gives the name of the program, how many blocks long it is and the number of each block as it is downloaded. This is initially in white and changes to green when complete. If there are any errors they are indicated and corrected on subsequent passes through the blocks.

The majority of the commands in the ROM are those used to access teletext from within a Basic program. The command set has been designed so that all transmitted software that uses 'live' teletext data can be used with the Morley unit. This has had to be done as the BBC transmits programs designed for use with the Acorn unit only, so that some 'dummy' commands are included to get round the 'Bad command' error. The one thing that will have to be taken out of some programs is the test for the value of PAGE, as this is used to check that the Acorn adaptor is receiving teletext.

When downloading software there is no real difference between the Morley or Acorn adaptors in the time it takes to go from block to block, as this is governed by the speed at which the broadcaster sends out the sequence of subpages that make up each file.

The time saving is that the Morley adaptor saves the files to disc at the press of the space bar, and ASCII files can be downloaded just as readily as tokenised ones. The Acorn unit leaves the program in memory, and a change of filing system is required before saving can take place (sometimes after first having to find out information from other Ceefax pages).

Where the Morley unit will succeed over the Acorn one is that it can receive 8-bit data transmissions, and not just on the existing, limited number of data lines but over all 625 lines of the TV signal. Thus, if cable TV takes off, we could see a whole channel being used for data – and pages being accessed almost as quickly as the number is entered.

In terms of price, performance, future expansion possiblities and those little touches that show thought for the end user, I would recommend the Morley unit.

*Morley Teletext Adaptor, £90.40 inc (£100.35 with psu), BBC B/B+ (Electron version under development)*

FIRMWARE

# PROS AND CONS

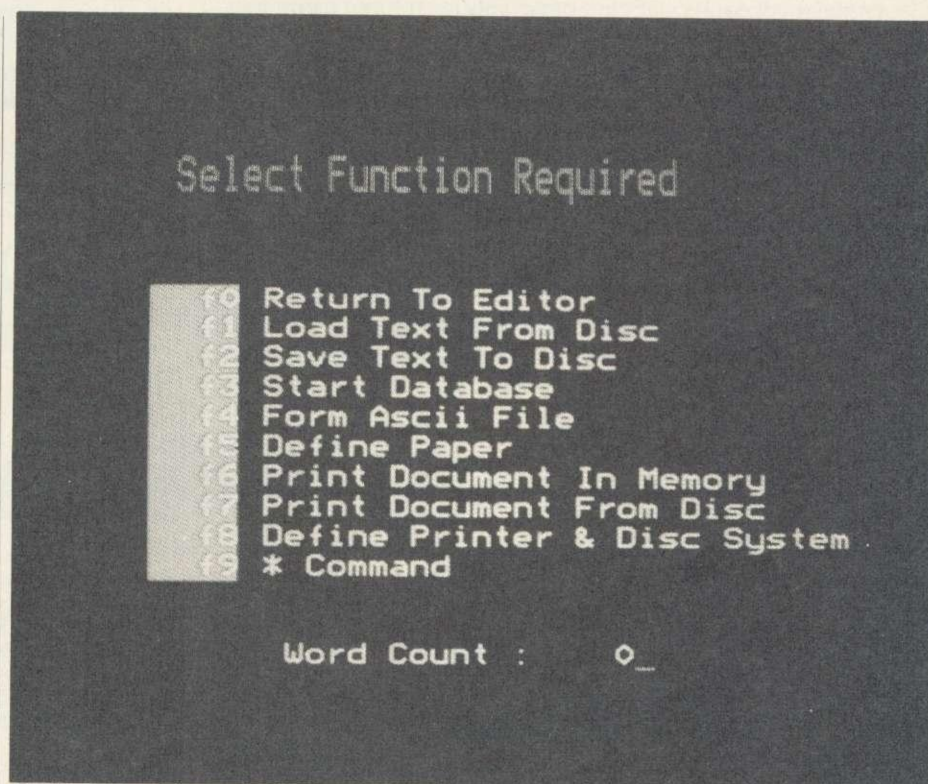
**Patrick Quick looks at a word processor which has many facilities, but also some limitations**

A ROM-based wordprocessor for the BBC micro, *ProWord* runs in a model B or B+, with or without second processor. Another version, *HiWord*, works specifically with the 6502 second processor and relocates to give extra workspace (like HiBasic or *HiView*), but I've only tested *ProWord* on a lonely model B.

## The good news

First the good news. *ProWord* has an impressive WYSIWYG (What You See Is What You Get) screen format. Bold, underlined, italic, inverse, superscript and subscript text is shown correctly on the screen. Six display formats are selectable, ranging from 80 characters wide x 32 lines deep to 40 characters x 12 lines deep (double height).

The print facilities are pretty comprehensive. You can print multiple copies of chained files from disc in the background while editing a different document. I was particularly impressed by the facility to output the odd-numbered pages, followed by the even ones, to make turning the paper over easier when doing double-sided copies.




***ProWord* offers an impressive WYSIWYG (What You See Is What You Get) screen format**

*ProWord* has a simple mail-merging system. This includes facilities to create, edit and select from your data. It's pretty good considering it shares the ROM with a wordprocessor, and should enable you to perform most mail-merging required. The manual refers to this as a 'database', which is rather fanciful.

More than 40 editing facilities are available using the function keys. Every function key plus the Tab and Copy keys are used on their own, with Shift or with CTRL, or both. Most functions liable to lose text are checked with 'are you sure?' (but loading a new text isn't). Also you can often 'restore' deleted text. The margins are useful, too, allowing paragraphs to be indented.

## Frustrating

And now for the bad news! I found *ProWord* frustrating to use. The wealth of key combinations was confusing and remained so even after using the package for a while. Using many of the facilities was unnecessarily difficult. For example, the find and replace functions are messy, and printer definitions and database functions are positively user-hostile.

The editor is word oriented, which is fine for many applications but can cause problems while editing Basic programs or technical material. For example, you are not allowed to have a 'word' longer than the printer's line length – I do that all the time in multi-statement Basic lines! It seems silly to put artificial limits on a piece of software.

The manual claims that: '*ProWord* has been written in such a way that references to the manual should be few and far between, after an initial reading.'

I've got two arguments with that. There are a terrific number of facts you need to know while using *ProWord*, and the manual is photo-reduced from a dot-matrix NLQ font and is very tiring to read.

You can read and write standard ASCII files but reading them consists of using *EXEC while editing, which is extremely slow. *ProWord*'s special files (for database, printer definitions, etc) are stored in the directory"!".

There seem to be a few bugs in the version I reviewed. In 40 column mode (actually only 39 columns) the word-wrap usually occurred at 39 characters but occasionally went further. Once the print width was changed to 60 columns although the manual says this isn't available. The file creation routine for mail-merge produced 'disc full' errors – sometimes even though I had started with an empty disc as instructed. Just to see what happened, I tried loading an ASCII file straight in. There was no error message – it just locked up.

I was annoyed when I exited *ProWord* to find that the arrow keys did not work correctly in *Wordwise Plus* (though, to be totally fair, I suppose *Wordwise Plus* should have re-initialised them correctly).

*ProWord* has an amazing number of facilities crammed into its 16k ROM. Many are very good but there are also several annoying limitations. The user interface is poorly thought out. In particular it lacks flexibility in most operations.

The author hasn't taken into account that different people use wordprocessors for different jobs. However, at £27.50 it is extremely reasonably priced.

If *ProWord* was less limiting and more user friendly I would switch from *Wordwise Plus* without delay.

*ProWord is available from T Hall, 31 Wethersfield Road, Noctorum, Wirral, Merseyside. It costs £27.50. There is another version, HiWord, which works specifically with the 6502 second processor.*

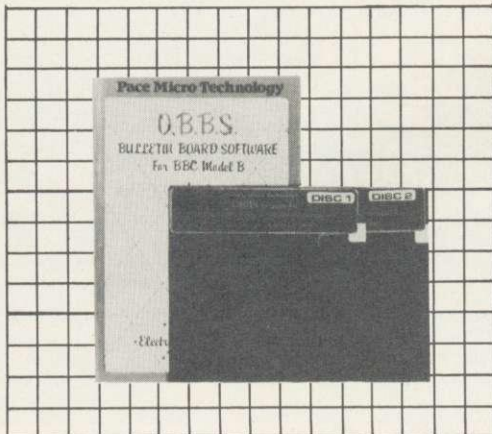
# New from Pace

## Nightingale Accessory Board




This new accessory for Nightingale offers three new facilities on a single card. The auto-dialler now means that you can dial any number without using the telephone. Software designed for use with Commstar will dial a specified number or sequence of numbers once or more until a connection is established, each call being optionally monitored through a loud speaker. Any number of directories can be created and for each telephone number in a directory you may specify a series of attributes which allow Commstar to configure itself automatically for that particular system. Nothing could be easier. Any baud rate may be configured under software control including two new operating speeds 1200 and 600 half duplex which were not previously available. Finally, if you hope to set up your own database or bulletin board, the accessory board includes auto-answering. Nightingale and accessory board, a complete solution.

**Accessory Board £49 plus VAT**
**Dialing Software £10 plus VAT**

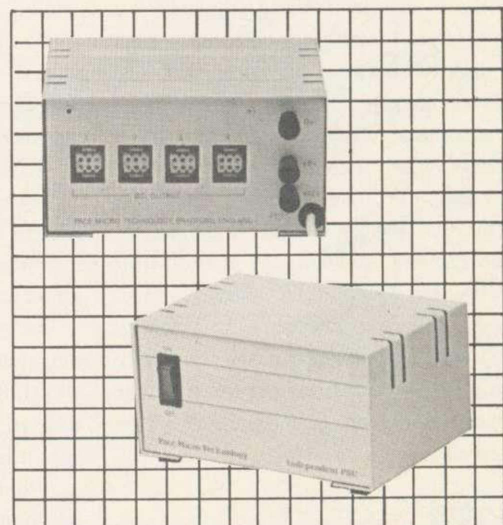



## OBBS Colour Bulletin Board Software

Transform your BBC Micro into a unique bulletin board, be your own sysop. If you already own a Nightingale modem fitted with the accessory board or indeed if you intend buying this combination, with OBBS coloured Bulletin Board Software, you can run your own bulletin board. The entry level system includes many features normally only found on systems costing ten times as much. Full message searching and XMODEM uploading and downloading of software are provided along with unique colour teletext graphics and text facility.

**£21 plus VAT**

## Independent Power Supply



We have designed this Independent Power Supply for those of you who use disc drives powered from the BBC power supply and are concerned that with the addition of Sideways ROM boards etc., the psu is being overloaded. The Pace independent power supply unit plugs directly into the mains and has four power output sockets of the type used on the BBC. This means that you can plug your unpowered disc drives, buggies etc., directly into this unit thus removing the strain from the BBC power Supply.

Technically speaking, the Pace Independent PSU takes 240V AC mains and gives out regulated +5V & +12V DC (±2%) and OV power through 4 parallel sockets. These sockets are of the same type as provided at the Auxilliary power output socket of the BBC microcomputer. Push connectors are also provided for all three voltage levels.

The unit is capable of supplying two single disc drives or one dual disc drive plus one or two other devices, such as Eprom programmers, which draw less current. The maximum current available is approximately **1.5A @ +5V** and **1.2A @ +12V.**

**£39 plus VAT**

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ROMS

# UTILITIES MAKE THEIR MARK

**Peter Sandford reviews three utility ROMs to aid your debugging**

Anyone who has programmed in Basic will know the frustration of tracking down an obscure and elusive bug that stops your latest program from doing its job. This review looks at two ROM-based utilities which aim to make the task of debugging a program far easier, plus a third ROM which adds a set of powerful new commands to BBC Basic.

*Sleuth*, from Beebugsoft, and Yorkshire Hitech's *Microscope* both offer the programmer greatly enhanced facilities for studying the progress and operation of a Basic program, allowing it to be stepped through a single line or statement at a time in a manner similar to many of the machine code monitors used in assembly language programming.

The third ROM, *Basic Extensions* (from Micro Power), also assists in debugging and editing Basic programs, although its main purpose is to add a set of new commands to Basic which extend its versatility and power.

These three pieces of software differ in many respects, so I'll look at each in turn.

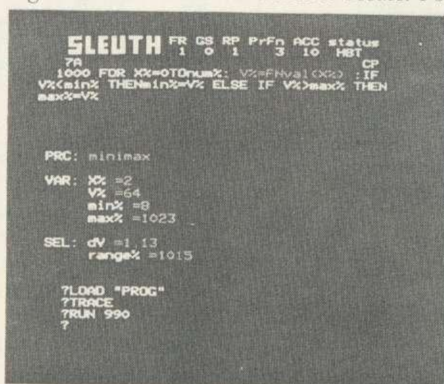
## Sleuth

Beebugsoft claims that *Sleuth* is 'the ultimate debugging tool for the Basic programmer'. Certainly it is a masterpiece of clever programming, making full use of the facilities available on the BBC micro to interrupt and control the operation of both hardware and software.

*Sleuth's* major feature is its dual screen mode of operation. Two screens are set up in memory, one acting as the normal screen for output from the program under examination, the second as its 'control' screen, providing a wide range of information about the state of program execution which can be viewed at will without affecting the program screen. You can choose to run through a program using either the normal program screen or the control screen, or alternating between the two as each statement executes.

Using the program screen only, the screen display of the program can be studied as it builds up line by line. An optional Trace facility will display the line number of the statement currently being executed in the top left hand corner of the screen. The program can be executed either a single statement at a time, or at a variable speed.

Program execution can be halted at any stage by pressing the '@' key or by setting breakpoints. Up to five line numbers can be used as breakpoints, and conditional breakpoints are also allowed. These cause the program to halt on reaching a specified condition, regardless of the line on which it occurs. For instance, if a program crash is being caused by the variable X exceeding a value of 20, you can set a breakpoint conditional on X>20. The program will halt as soon as this condition occurs, allowing you to study the section where the trouble arises and take the necessary remedial action.



**Sleuth's major feature is its dual screen**

Having halted the program at any stage, the Tab key can be used to toggle between the program screen and control screen. This control screen offers an attractive mode 7 display with a wealth of useful information about the state of the program. The current program line is shown with the next statement to be executed highlighted in colour. The value of all variables referenced in this line is displayed, including any array elements.

Below this is a window which can be used to keep track of the value of selected key variables. Other information identifies the name of the current procedure and gives details of the current level of nesting of loops, subroutines, procedures and function calls. Status flags identify which of *Sleuth's* many features are currently active.

The control screen can be used to enter commands to activate or modify *Sleuth's* various facilities at any stage. For instance, breakpoints can be reset, or single stepping can be engaged to test a critical section of program. It is also possible to list the program or alter the value of any variable, so that sections of program can be tested for critical values. A 'multi-step' feature allows loops or procedures to be skipped through to save time when using the single-step facility.

If an error occurs while running a program with *Sleuth* active, the program will stop, leaving you in the control screen with the error line listed and the statement close to the error highlighted in green. It is not possible to make program modifications directly from the ROM, however. If you need to correct a program line, you must first quit *Sleuth* and return to Basic, correct the offending line, and then re-enter *Sleuth* to resume debugging.

Two different versions were provided for review. The first, version 1.04, was the current production version. Beebugsoft later supplied an enhanced version which is now being marketed, and it is important to note that the comments made in this review relate to this later version.

A number of features have been introduced which overcome certain limitations of the earlier release. Most important of these is a facility to quit *Sleuth* and run through long or repetitive sections of program at full speed, and then interrupt the operation and return to *Sleuth's* control screen by pressing Shift-@. The absence of this facility on the earlier version made it extremely tedious to skip through long sections of program, with program execution slowed down to approximately 15 times the speed without *Sleuth* active.

Another important enhancement is the method of listing a program from within *Sleuth*. The new release offers a much faster listing, with an added feature whereby the current program statement is highlighted in green, making it easy to identify. The new version is fully compatible with the Aries B20 and Watford 32k memory expansion boards, and if sideways RAM is present in one of the ROM sockets this can be selected as workspace for the dual screen facility, allowing *Sleuth* to monitor the longest of programs. Other enhancements include a facility to display the values of variables in decimal or hexadecimal format and to show or alter the contents of memory directly, plus a new 'Status' display detailing the current values of PAGE, TOP, LOMEM and HIMEM.

Overall, I found *Sleuth* to be an extremely sophisticated and powerful utility. It provides full control over the operation of a Basic program, and should prove invaluable in sav-

ing debugging time. The dual screen facility in particular makes it ideal for studying and monitoring programs using graphics or producing complex screen output. It also has obvious potential as a technical tool for students of Basic programming. It is, however, complex, and repays careful study of the instruction manual to make full use of its facilities. Although Beebugsoft claims that it is 'ideal for the novice and expert alike', I suspect that a raw beginner would find the package difficult to master.

### Microscope

*Microscope* is a slightly less ambitious (but cheaper) piece of software than *Sleuth*. It does not have the sophistication of dual screen operation but offers an extended Trace facility whereby several options can be selected to display various aspects of program execution on-screen while it is run. Once set, these options are activated by the command *TRACE ON prior to running the program.

Many of the options available offer similar features to *Sleuth*, each being activated by means of a 'star' command. For instance, *PAUSE ON causes single step mode to be entered. In a similar manner, the command *SHOW determines whether or not each program line is to be displayed as it is executed.

*Microscope* allows the value of selected program variables to be displayed constantly on-screen. Like *Sleuth*, these can be shown in decimal or hexadecimal format. However, with *Microscope* it is not possible to display array elements, nor to alter the value of individual variables during execution.

Two unique features are offered which may prove attractive to certain users. First, it's possible to obtain a constant display of the contents of a chosen block of memory as the program executes.

Second, *Microsope* makes it possible to monitor more closely the path taken through a program by a feature which constantly keeps a record of the last 20 line numbers executed. By default, the last five line numbers are displayed at the top of the screen, and this can be increased up to 20 if required. It's possible to interrupt the program at any stage and obtain a listing of these lines.

Programs can be interrupted either by pressing '@' or by using preselected breakpoints. Up to nine line breakpoints can be set, but conditional breakpoints are not available. It's also possible to specify the limits of the program over which the Trace facilities are to be active, enabling you to run through to the section you wish to study in detail very quickly and easily.

Having halted the program, *Microscope* allows you to set or reset its various facilities before continuing, or to list or otherwise analyse the program. One useful feature is the command *DATA which provides an instant display of various information about the status of the program – the values of PAGE, TOP, LOMEM, HIMEM and VARTOP, and detailing the memory usage of the program and its variables. Other facilities are available to allow you to clear the screen, list the program, etc, before continuing.

An optional error-trapping facility is provided which will automatically display the line in error with a marker indicating the approximate position of the error. Unlike *Sleuth* it is possible to edit the program line immediately, without the necessity to deactivate or exit the ROM.

It's worth noting that *Microscope* differs from *Sleuth* in the way it handles its single step mode. In *Sleuth*, each individual statement is executed singly, whereas *Microscope* executes a whole line at a time. Multistatement lines that include a complete FOR . . . NEXT loop are therefore executed as if they are a single statement, which can speed up the process of stepping through the program. A special command is provided to split all multistatement lines into single line if required.

A peculiar feature is the manner in which multi-line FOR . . . NEXT loops are displayed. Although the actual execution of the program is unaffected, the line immediately following the FOR line is displayed only once. Special commands are included to allow dummy blank lines to be inserted and removed from your program after every FOR statement to enable the following statement to be displayed normally.

Although this is all explained in the manual, I can see no logic whatsoever in this. *Microscope* has considerable potential as a teaching aid for elementary programming, and I think it is a great shame that this peculiarity should obscure the normal course of execution of a fundamental programming structure.

If you choose to have all the options active, *Microscope* can provide a wealth of information allowing you to monitor program execution. However, all this data takes up a considerable amount of the screen display, leaving only limited space for the program output. This places a very serious limitation on its usefulness for programs that produce complex screen output or use graphics. *Microscope's* display will overwrite any information displayed in the upper portion of the screen by the program itself, and there is no provision for setting up screen windows to segregate the two. In fact, *Microscope* automatically clears any screen windows that have been defined by a program. If windows are required it's possible to direct the ROM's output to disc or printer instead of to the screen, but this option's unlikely to appeal to the average user.

Overall, I found it easier to master than *Sleuth*. The lack of a dual screen facility will seriously limit its usefulness for many applications, especially those involving graphics. However, because program output and execution can be monitored on screen simultaneously, it may be more useful for educational purposes, such as instruction in elementary programming. At only £17 it would seem to be good value, but I urge Yorkshire Hitech to overcome the peculiar handling of FOR . . . NEXT loops and introduce a simple facility to give the user full control over the screen windows.

### Basic Extensions

This ROM differs considerably from *Sleuth* and *Microscope* because its main purpose is to add a number of new commands and program structures to BBC Basic.




But some of these are intended to assist in error trapping and debugging, so I'll consider them here.

The *Basic Extensions* ROM provides you with instant access to 38 new commands. All are entered as though they are part of Basic, without needing to be directed to the operating system.

The new commands fall into two categories. The first are utilities which are entered in command mode (in a similar manner to Basic's LIST and RENUMBER commands), to help in writing and debugging a program. The second consists of statements which can be inserted directly into a Basic program, and these provide access to four powerful new program structures.

The latter group of commands are undoubtedly the most attractive feature of this ROM. Of the four new program structures, two in particular will be familiar to those with experi-



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## ROMS

ence of other, more highly structured languages. The first is the WHILE . . . ENDWHILE loop, which has always been a sad omission from BBC Basic, and is similar to a REPEAT . . . UNTIL loop, except that the condition for exiting the loop is tested at the beginning, and the loop will not be executed if the condition is false on entry. Although this can be simulated in standard BBC Basic, it requires the use of a GOTO and is not particularly elegant.

The CASE . . . WHEN . . . OTHERWISE . . . ENDCASE structure is somewhat more complex and is based on a structure used in Pascal. This is a neater and more powerful variant of Basic's ON . . . GOTO structure and tests the value of a specified variable to determine the course of program execution.

The third structure is made up from the commands LOOP . . . EXITIF . . . THEN . . . ENDEXIT . . . ENDLOOP. LOOP and ENDLOOP set up a loop which will continue to execute endlessly if left to itself (avoiding the need to use the REPEAT . . . UNTIL FALSE structure employed in many examples in the User Guide, for instance). EXITIF provides the means to exit the loop, and allows an optional set of instructions to be carried out before continuing program execution at the line following ENDLOOP.

The fourth new structure is FIF . . . THEN . . . ELSEIF . . . ENDIF. This is simply an expanded form of the IF . . . THEN . . . ELSE structure, allowing instructions to be split over multiple program lines. This avoids the need for cumbersome multi-statement lines, improving readability and avoiding any restrictions imposed by the maximum line length on IF . . THEN . . ELSE.

The inevitable problem with these new commands is that programs will only be transportable to other machines if they also have the same ROM fitted.

If you have any intention of writing software for general use, you will have to avoid using them. As a partial solution, Micro Power does offer a 'run time module' on cassette for a nominal cost of £1. This can be loaded into another machine to execute programs written using the extensions.

Most of the remaining new program statements provide neater methods of implementing existing facilities which normally require use of VDU codes. New commands are provided to set logical colour values, text and graphics windows, and graphics origin. These all improve program readability, but are subject to the same problem of program portability. Perhaps most useful is LPRINT, which can be used to send output directly to the printer, and will be welcomed by anyone who has had to translate programs such as the Microsoft Basic examples in the Epson printer manual.

The command mode utilities offer new facilities for use in editing and debugging programs, plus one or two miscellaneous commands such as SECURE, which can be used to set a temporary password preventing unauthorised use of your machine. Also included is a modified version of LISTO which allows for indentation of all the new program structures when listed.

Program editing is facilitated by the commands FIND, SEARCH, and REPLACE. These allow you to search and list all occurrences of a given string and to replace it selectively or globablly as required. A wildcard character can be used, and the search string can include Basic keywords. The command SHIFT allows you to duplicate and renumber sections of program, and COMPACT will strip out spaces, REMs and assembler comments. Other commands include DTOB and BTOD, which will convert a number from decimal to binary and vice-versa, and four filing system utilities.

Debugging is assisted by an enhanced error handler. Like *Microscope* and *Sleuth*, if an error occurs the offending statement is listed automatically with an indication of the error position, ready for instant editing. The command DUMP will print out all variables and their values, with an option for output in hex. STATUS provides similar information to *Microscope's* *DATA, detailing the program length, space occupied by variables, and free memory remaining.

Debugging is further aided by the command CONT, which will restart execution at the statement after the one in which the last error occurred, even if the error is inside a structure such as a FOR . . . NEXT loop. The values can be changed before continuing, but editing of program lines can sometimes have the most unpredictable results.

All the new commands can be shortened in the same way as Basic keywords. If you are accustomed to using abbreviations such as E. for ENDPROC, F. for FOR, and LO. for LOAD, then you'll need to revise your habits straight away as the new keywords take priority for minimum abbreviations – in other words, E. becomes ENDCASE and LO. becomes LOOP.

If entering program lines in AUTO mode, F. I%=1 TO 10 is interpreted as FIND "I%=1 TO 10", and the ROM will break out of program entry and merrily shoot off to search for this string. I found this somewhat annoying at first, but no doubt it's possible to become adjusted to this feature quickly.

On initialisation, this ROM will claim a page of memory immediately above the normal setting of PAGE for use as its workspace. PAGE on a disc machine will therefore be reset to &1A00.

The command KILL is provided if you wish to disable the ROM and reclaim this space, although it will re-activate if Break is pressed. If you've disabled the ROM and loaded a program to &1900, pressing Break will corrupt your program as the ROM reclaims its workspace. I should have preferred to see a 'break-proof' facility that would disable the ROM permanently if required.

Apart from these relatively minor criticisms, it's difficult to fault the ROM on technical grounds. The new program structures should appeal to all advocates of structured programming, and they provide excellent extensions to BBC Basic.

Most of the command mode utilities are also attractive, but it's worth noting that there are other, more specialised, ROMs available which provide a wider range of utilities for program editing or debugging. The value of this ROM must, therefore, be judged on its program extensions. If you want to improve the structure and readability of your programs and have no intention of using them on other machines or of marketing them for more general use, then the Basic Extensions ROM offers excellent value.

### SUPPLIERS AND COMPATIBILITY

All three ROMS should be compatible with the B+ with shadow RAM off.

**Sleuth £29**
Beebugsoft, PO Box 50, St Albans, Herts.
Available for Electron and BBC micro. Tube compatible version due out early next year.

**Microscope £17**
Yorkshire Hitech, PO Box 19, Barnsley, South Yorks.
Available for BBC micro only. Not compatible with second processor.

**Basic Extensions £19.95**
Micro Power, Northwood House, North Street, Leeds.
Available for BBC micro.

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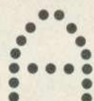
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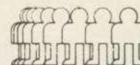
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# REVIEWS

## SOFTWARE

### THE ULTIMATE INDEX?

MAGAZINE BIBLIOGRAPHY
This program offers 3 choices-
(1) View the whole bibliography.
(2) View one specific section.
(3) One or two-string searches of the whole bibliography.
Press the number of your choice

**'Magazine Bibliography', McHugh Enterprises, BBC B, disc £80**

The *Magazine Bibliography* is a resource which enables the user to find information from magazines by looking up references in a large database of material. The database relates to items from every page, other than advertising, of *Acorn User, Micro User, Beebug, A & B Computing* and *Educational Computing*. Any information, be it an article, a letter from a reader, editorial or news columns, will be noted and a brief description given of the information available.

It is this brief description that is the key to the whole business. Jim McHugh, who runs the whole show, has cleverly contrived his abstracts so that they contain the maximum number of 'keywords' that relate to the item being studied.

When searching the database one is able to search either all or only part of it – for example one may know that an item has appeared this year so there is no necessity to search back three years – and there one defines either one or two keywords or part words or phrases that the search is to be made on.

As an example, one may want to find out about the use of networks in schools. If one entered 'school networks' as the search string this would be ineffective, but 'school' and 'network' or even just 'net' would pull in items with any occurrence of *both* of those elements in them. All it needs is for the user to then turn to the appropriate issue of the magazine and find the right page.

The output may be to a printer or to the screen. It is really more effective to the printer, however, since the searches tend to throw up an awful lot of material – hardly surprising when one considers that there are four sides of 80-track disc full of data for this package, and it's growing every month.

McHugh does an update service and you can become part of his regular mail service simply by writing to him. It may at first seem that the package is expensive but, if you do any amount of reference-checking, if you need information fast and if you consider the amount of graft that has gone into this piece, you'll not begrudge a penny of it. Jim will tell you quite happily, he has an army of satisfied customers!

**Nick Evans**

### DESIGNS ON SOFTWARE

PIXEL PLOTTING
The control codes 145 to 151 enable a range of graphics shapes to be produced when followed by lower case letters. For example CTRL/f0 inserts a code for red graphics on the current line. When followed by a lower-case letter 'g' the shape is printed. CTRL/f2 followed by 'h' produces the shape ▮ These shapes are made up from [illegible] of six 'pixels', 2 across & [illegible]. To avoid the necessity of [illegible] to refer to charts in order to [illegible] which keys produce particular [illegible], the COPY key toggles a special PIXEL PLOTTING MODE on and off. The QWASZX keys are used to plot and remove individual pixels and the I key reverses their states.
PRESS SPACE TO CONTINUE

**'Design 7', M/B Software, BBC B, disc £8**

At first sight I thought that here was yet another mode 7 screen designing pack – so what could this have that would make it better than others already on the market?

The answer is that it has quite a lot going for it, and it out-performs most of the others available (which quite often cost many pennies or pounds more).

The program contains a very full description of the facilities and controls in a 'Help' file. All the commands are summarised in the user guide or on the function key strip. All combinations of the function Shift and Control keys are used.

For some of the more critical operations (primarily deleting what you have just created from the screen) the choices are highlighted on the function key strip, and you are given the option to execute or abort. This sensible feature has saved me from destroying screens on more than one occasion!

The system allows the user to design a screen of text, graphics or both; and then adds this as a procedure to the end of a Basic program that displays the finished product as a simple slide show.

There are key areas where I felt that this program performed really well.

First, *Design 7* has wordprocessing-type on-screen editing facilities. That is, inserting or deleting single letters, or lines, selective or global changes of code and block move and delete functions.

Second, there are four sizes of text directly available, so gone are the days of having to flip between the pages in the back of the User Guide trying to work out which letter gives the shape you want!

Third, the ability to 'cut and paste' parts of old pages to create new ones. So, not only can one part of a screen be copied onto another part of the screen, but they can be saved and re-used with other screens.

Finally, and probably the best feature, was that it works directly with the Morley teletext adaptor to load screens from Ceefax or Oracle. These can then be edited in the same way as screens you have designed yourself.

This could be a real bonus for teachers who want to include this type of data for use in the classroom.

I was very impressed with this piece of software, and became quite familiar with all the various editor controls in no time at all.

The screen shot has been prepared showing some details of pixel plotting, a feature of *Design 7*.

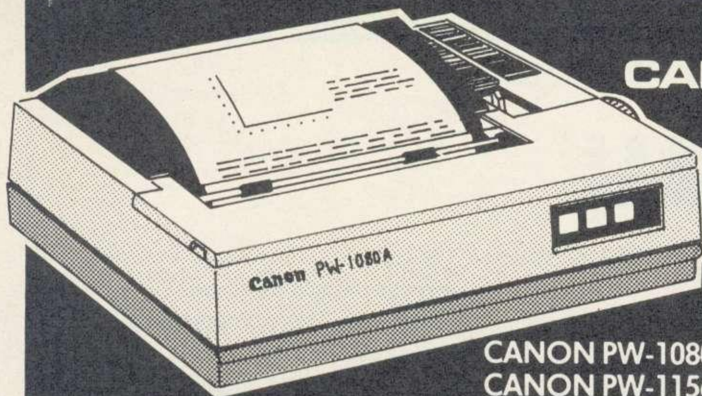
To accompany *Design 7* are two other pieces of software, a Fax system and a 'carousel'. These come with an editor which is fully compatible with *Design 7* and gives two very different methods of presenting screen pages. The Fax system gives a random access system to all the screen pages you have created: ie, a Videodata system.

The carousel is a program that lets the user select various screen pages (from *Design 7* or the Fax system), and display them as a continuous sequence.

This gives the possibilities of an electronic notice board with many screens, or simple animation of a single image (because up to 10 screens can be held in memory and quickly interchanged).

For the price of the design software and the carousel and Fax systems, this must be a strong new contender in the education market. It certainly has many of the features missing from some systems already on the market. Food for thought is that a 'patch' has been written to allow *Design 7* screens to be used within *Microtext*.

**Trevor Buck**




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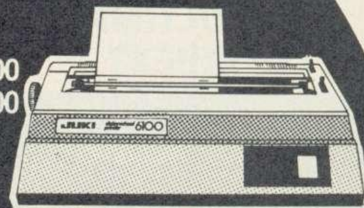
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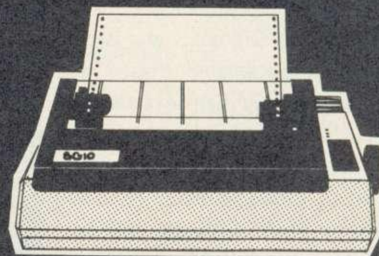
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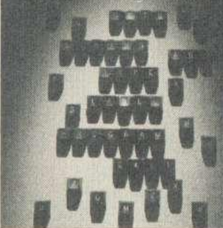
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# PRINT QUALITY

# REVIEWS

## BOOKS

### NO FAULT FOR PASCAL




**'Pascal For Basic Programmers', by Charles Seiter and Robert Weis, Addison-Wesley, £10.95**

Both Basic and Pascal are computer languages which have been adapted well to microcomputers. Although similar in many ways both have marked differences, strengths and weaknesses. No doubt an extended, structured, Basic is the right language for beginners on microcomputers. (Do I hear cries of dismay from the structrualists?) It is ideal for small computers with a limited memory capacity since it can provide an immediate response to program changes – useful for the novice programmer. Pascal, however, offers both increased sophistication and power to everyday programming.

This book is totally orientated towards the reader who has a personal computer, is familiar with Basic and who wants to investigate the power, structure and convenience of Pascal.

It is a volume of five parts: first, there's a chapter that, with a suitable micro, will allow 'hands-on experience' with a subset of Pascal right away. Second, there is a simple discussion of the process of translating high level languages into machine code (including the influence on the varieties of Pascal). Then there is a section on the practical aspects of programming followed by a description of the process of planning and writing a Pascal program (included here are two useful, illustrative programs). Finally, the book contains a most useful Basic to Pascal phrase book.

The book compares Microsoft Basic and UCSD Pascal, both of which the authors state are '. . . . the most popular forms for microcomputers.'

The first chapter really gets the reader to grips with Pascal without throwing him/her into the deep end. By focussing on how the simplest programs are organised, the different approaches of the two languages to control statements are emphasised.

At a very simple level Pascal certainly seems more cumbersome and wordy than Basic, but the authors reveal the virtues of Pascal in the chapters which follow.

This introductory chapter is a real gem. It provides that most essential element for a newcomer: immediate understanding and success. After an evening spent typing in the simple examples given, I certainly had a clear idea of how Pascal is organised. Such is the clarity of the text, I found myself well motivated to read on to discover the various control statements, syntax and structure.

With the aid of so many concrete examples, transferring to Pascal is certainly far easier than I first anticipated. I began to accept that Pascal has many advantages over Microsoft Basic. As the book points out, it is superior for longer programs – it can organise them into semi-independent pieces. It doesn't simply encourage the programmer to write in a structured way . . . it makes him! The advantages are obvious: readability and easy debugging.

When Niklaus Wirth specified the original design of Pascal, he knew it would greatly enhance the value of the language if he could make it available for a number of different computers. The authors give detailed explanations of high level languages which are either interpreted or compiled into machine code and present them in a convincing argument for UCSD Pascal.

The remaining chapters explain in detail each aspect of the language from simple assignment statements through to procedure nesting. At each level copious examples are given to illustrate or extend points made in the text. The examples shift their emphasis progressively from Basic in the early stages to entirely Pascal in the latter.

The final section of the book compares MBasic (v5.2) with UCSD Pascal (v2.0). It is essentially a dictionary enabling programmers to quickly access the operation they require (in Basic) and then to find the equivalent operation in Pascal.

Frankly, it is difficult to fault *Pascal for Basic Programmers*. Clearly, Charles Seiter and Robert Weis have a considerable understanding of the learning process – the text is clear and carefully considered.

For any serious programmer wanting to take advantage of the discipline of Pascal, this book is an important step to successful application programs. Here is a practical, informative guide to learning to use that power.

**Chris Drage**

### LOGICAL INTRODUCTION

**'Play Logo', John Cunliffe, Andre Deutsch, £5.95.**

*Play Logo* is an introduction to Logo for parents and children alike and is a simple jumping-off point which enables users to get started quickly and easily. It should be pointed out that *Play Logo* has been written around the Atari Logo and Commodore 64 versions and, although there is a conversion table at the back of the book and the various Logos are by and large compatible, it does mean that the machine commands and layout tend to be different. Bearing this in mind the reader may then approach the subject with necessary caution. A child alone with this book and a BBC micro would probably become confused because of references, for example, to Caps/Lowr and Delete Back S keys. Nonetheless with parental guidance there are no major problems.

The book itself is excellent both in design and in the way the subject is presented. Keystrokes are clearly planned out and it is unlikely that a child would be able to misinterpret the commands in the early stages because the author is at great pains to make sure that all goes well.

Fundamental primitives are dealt with in small groups with test problems and exercises to check that the child knows what he is doing. As the book progresses, so the child is introduced to simple procedures, how to write them, incorporate them into other procedures and how to edit them. The logic of the procedures is explained by comparison with everyday tasks.

The author obviously uses the Logo language regularly with children because ideas have been included that might not at first sight seem necessary, but have obviously caused some problems when he used the language with classes.

Variables, colour and even sound are dealt with – although the author does not think much to the BBC's capabilities in this line because of the complexity of the Sound and Envelope commands.

Finally, a glossary and reading list as well as a conversion chart for primitives in various versions is included.

A good introduction at a reasonable price.

**Nick Evans**


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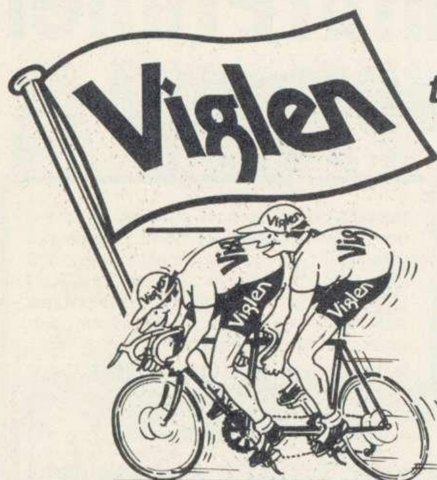
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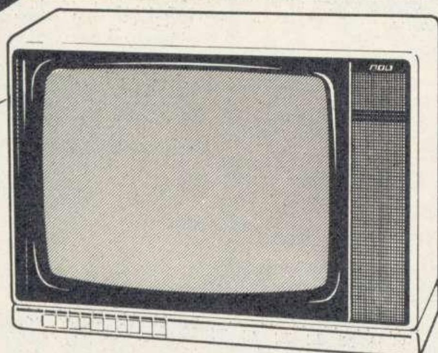

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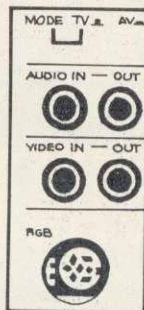
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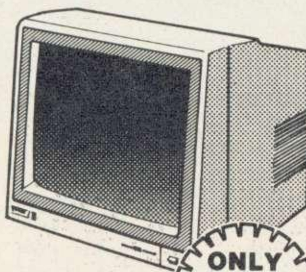
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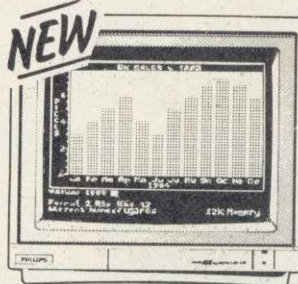
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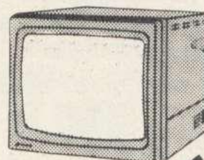
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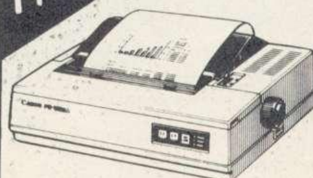
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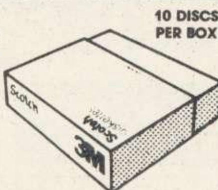


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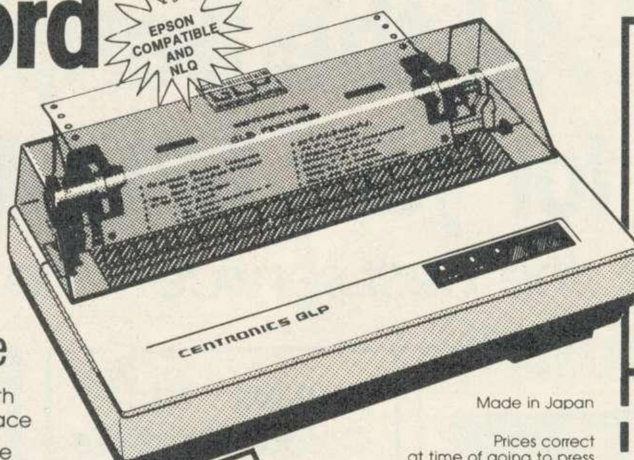
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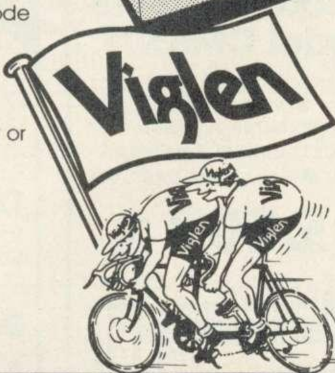
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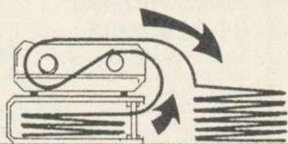


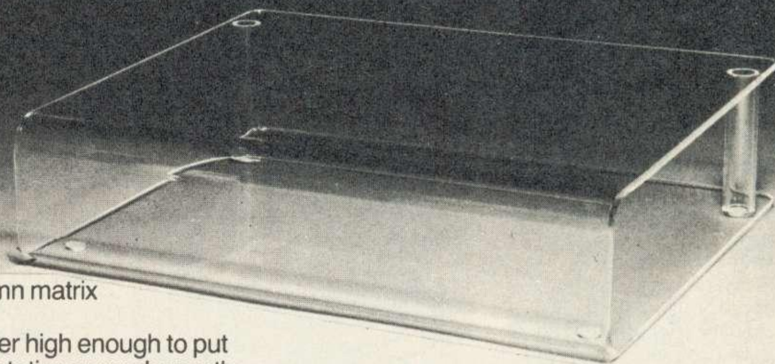
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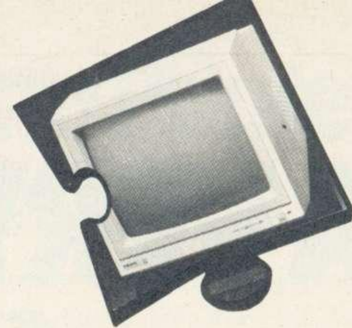
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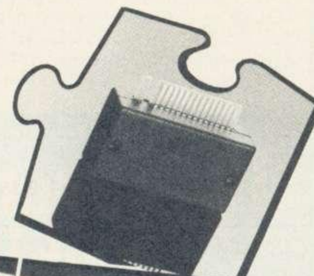


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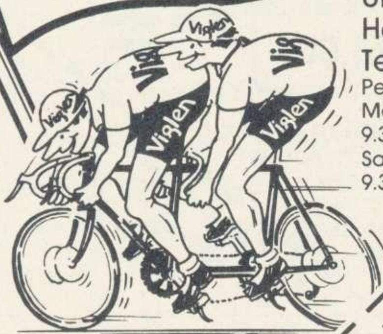



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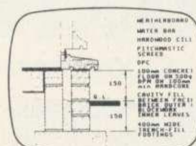
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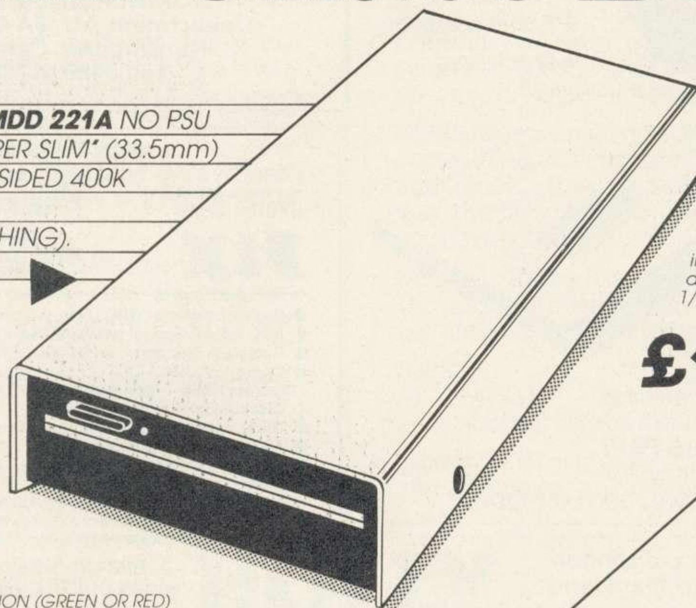
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*FLOPPY DISC DRIVE*
*(40/80 TRACK SWITCHING).*



***SPECIFICATIONS:***
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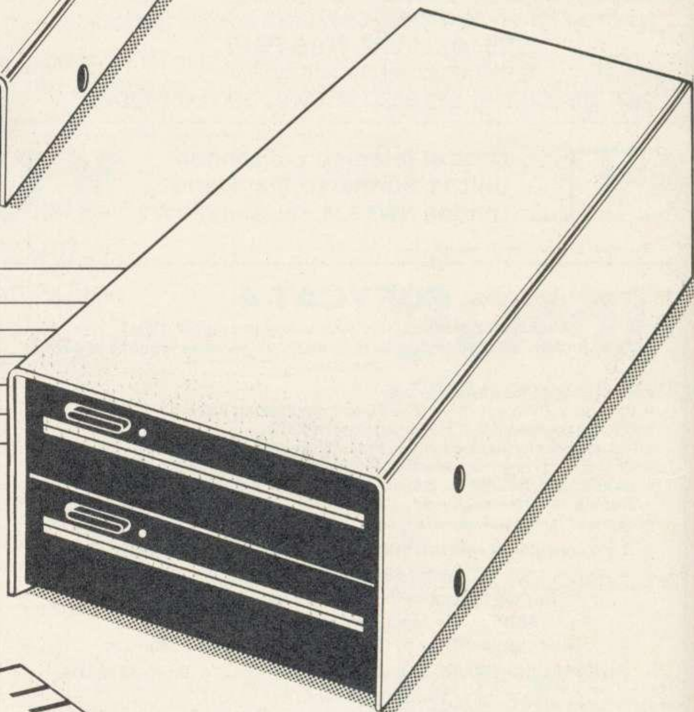
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**2**

***CANON DUAL MDD 221A***
*WITH PSU*



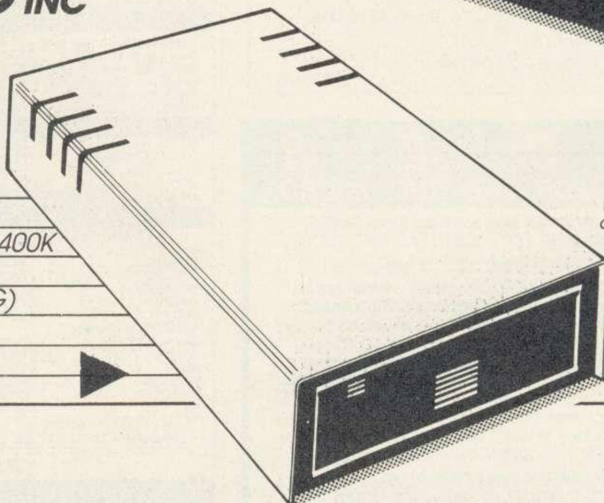
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*(40/80 TRACK SWITCHING)*



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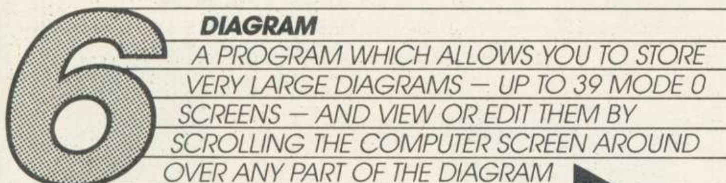

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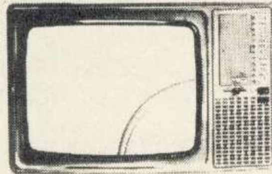
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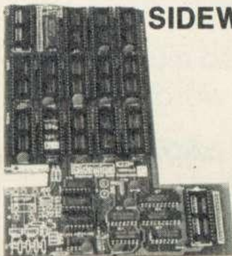
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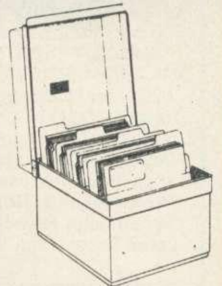
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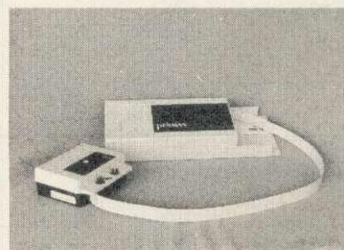
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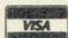
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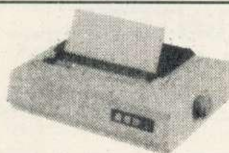
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**London.** Radio Amateur Micro User Group (G4KCS): The Secretary, c/o R. A. Webb, 39 Aldworth Road, Stratford, London E15 4DN
**London.** Wandsworth Computer Club: C. Verrier, Earlsfield Library, Magdalen Road, London SW11
**East London.** SOBAT Computer Club (East London): Mr T. A. Kayani, 12 Calderon Road, London E11 4EU
Tel: 01-556 5423
**North London.** BBC Micro Users Group: Mr Ric Keyworth, 'The Penthouse', 4b Kilburn High Road, London NW6 5UL
Tel: 01-734 9235
(7am-3pm Mon-Fri)
**North London.** 6502 North London User Group: Jim Chambers, Dept. of Psychology, University College, 26 Bedford Way, London WC1.
Tel: 01-387 7050 Ext 413
**West London.** Personal Computer Club. Contact Blue Tel: 01-579 5415. Chris Tel: 01-743 1579. Steve Tel: 01-540 6271

## SOUTH-EAST

**Aylesbury.** BBC Micro User Group: Aston Clinton County Combined School, Twitchell Lane, Aston Clinton, Aylesbury, Bucks HP22 5JJ
Tel: 0296 630276
**Bognor Regis.** Bognor Computer Group (BUG): E. R. Piper, 2 Ely Gardens, Aldwick Park, Bognor Regis, Sussex PO21 3RY
**Bottisham.** BAUG: (Bottisham Acorn User Group), G. F. Wilcockson, 19 Gallows Hill, Saffron Walden, Essex CB11 4DA.
Tel: 23793
**Bracknell.** Bracknell Primary Schools Computer Users Group: D. Donaldson Secretary, Wildridings County Junior School, Netherton, Bracknell, Berks RG12 4DX
**Brighton, Hove & District.** Brighton, Hove & District Computer Club: J Smith, Secretary, 30 Leicester Villas, Hove, E. Sussex BN3 5SQ
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Tel: Amersham 6103
**Camberley.** Camberley Computer Users Club: David Crosby-Clarke.
Tel: Crowthorne 771590,
Prestel mailbox 344771590
**Carshalton.** Acorn Atom User Club: Andy Nicholls, 4 Tavistock Road, Carshalton, Surrey SM5 1QR.
Tel: 01-644 9953
**Caterham.** Computer Club: Caterham Leisure Centre, Godstone Road, Caterham, Surrey CR3 6RE.
Tel: Caterham 48304/43316
**Dartford.** CP/M User Group: Diana Fordred, 72 Mill Road, Hawley, Dartford, Kent
Tel: 0322 22669
**Guildford.** West Surrey Computer Club: Jan Spencer, 52 Lindfield Gardens, Guildford, Surrey GU1 1TS. Tel: 0483 63512
**Harpenden.** Microcomputer Group: R. Welch, 7 Tylers, Harpenden, Herts AL5 5RT
**Harpenden.** International Adventure Club: Simon Martin Clarke, 10 Ennis Close, Harpenden, Herts AL5 1SS
**Harrow.** Harrow Computer Group: Bazyle Butcher, 16 St. Peter's Close, Bushey Heath, Watford WD2 3LG
Tel: 01-950 7068
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Tel: 01-554 9825
**Iver.** Iver Computer Society (IC's): John Haigh, 11 Colliston Walk, Ford's Farm, Calcot, Reading, Berks RG3 5ZJ
Tel: 0734-417534
**Kent.** CP/M User Group: 72 Mill Road, Hawley, Dartford, Kent
**Milton Keynes.** BEEBACC: Brian Pain, 40a High Street, Stony Stratford, Milton Keynes.
Tel: (0908) 564271
**North & Mid Essex.** User Group (NAMEBUG): Andy Purkiss, 12 Palm Close, Witham, Essex.
Tel: 0376 515609
Prestel: 3765 15609
**South East Essex.** BBC User Group (SEEBUG): Miss J. Lines, 97 Oakhurst Drive, Wickford, Essex SS12 0NW
Tel: 03744 63396
**Sutton.** Sutton Library Computer Club: The Secretary, 21 Village Row, Sutton, Surrey SM2 6JZ
**Welling.** Computer Users Club: Tony Latham, 69 Hadlow Road, Welling, Kent DA16 1AX

## SOUTH & SOUTH-WEST

**Alton.** Alton Computer & Electronics Society: Kevin Weatherhead, Sheen, Old Odiham Road, Alton, Hants GU34 4BW
Tel: Alton 87478
**Bristol.** Format 40/80 Club: BBC Disc User Group, Peter Hughes, 5 Marsh Street, Bristol BS1 4AA
Tel: 0272 799979
**Fareham.** Porchester & Fareham Computer Club: Simon Ward, 9a East Cams Close, Downend, Fareham, Hants PO16 8RP
**Gosport.** BOGBUG: Borough of Gosport BBC Users Group, Graham Dubber, 128 Wych Lane, Gosport, Hants PO13 0TE
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**Burton-on-Trent.** Beeb Users' Group (Bug Club): Linda Yeomans, 13 Regent Street, Church Gresley, Burton-on-Trent, Staffs DE11 9PL
**Derby.** The Derby Microcomputer Society: F. Taylor, Secretary, c/o 5 Park View Close, Allestree, Derby DE3 2GH
Tel: Derby 559334
**Huntingdon.** RAF Personal Computer Association: Sqn Ldr J. A. Upham, Man S (ADP), HQ RAFSC, RAF Brampton, Huntingdon PE18 8QL
**Norwich.** Amateur Computer Club: Andy Leeder, Church Farm, Stratton St. Michael, Norwich NR15 2QB
**Norwich.** Norwich & District BBC Microcomputer User Group: Roy Street, Church Farmhouse, Themelthorpe, Dareham, Norfolk NR20 5PS
Tel: Foulsham 579
**Nottingham.** BBC Micro User Group: John Day, 8 Warkton Close, Chilwell, Notts NG9 5FR.
Tel: 0602 225660
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Tel: 0789 68080
**Suffolk.** West Suffolk BBC Micro Users' Club: Antony Hurden, 14 Plovers Way, Bury St, Edmunds, Suffolk IP33 2NJ

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**Cumbria.** West Cumbria User Group: P. Majid, Tel: 0946 62732 or
K. Purkiss, Tel: 0946 66586
**Mersey.** Mersey BBC User Group: Nik Kelly, 56 Queen's Drive, Liverpool L4 6SH
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## NORTH-EAST

**Huddersfield.** Huddersfield BBC Micro User Group: Stuart Mallinson, 34 Ryefields, Scholes, Huddersfield, West Yorkshire HD7 1XF
**Hull.** Forum 80: 421 Endike Lane, Hull HU6 8AG
**Hull.** MUSE (for teachers): PO Box 43, 231/2 Friary Chambers, Whitefriargate, Hull HU1 2HD.
Tel: 0482 20268
**Hull.** TRS-80/Beeb Users Group: R. V. Souter, Secretary, 4 Risby Garth, Skidby, Cottingham, Hull HU16 5UE. Tel: 0482 845326
**Keighley.** Keighley Computer Club: Colin Price, 'Apple Garth', The Hob Hill, Steeton, Keighley, W Yorks.
Tel: 0535 54738
**Newcastle.** Newcastle & Washington BBC User Group (NEWBUG): Jeff Cranmer, c/o Washington Town Centre Library, The Galleries, Washington, Tyne & Wear.
Tel: Houghton (927) 849342 after 6pm
**Sheffield.** ABUG: John Fryer, Treasurer, 17 Edgedale Road, Sheffield S7 2BQ
**Sheffield.** Parsons Cross BBC User Group: Andrew Grant, 28 Rokeby Road, Sheffield S5 9FU.
Tel: 0742 461203
**S Yorks.** South Yorks Personal Computer Group (SYPCG): Bob Hindle, 139 Penrhyn Road, Sheffield S11 8UP
**Wakefield.** Wakefield BBC Micro User Group: The Secretary, 116 Pinderfields Road, Wakefield, West Yorkshire WF1 3PL

## SCOTLAND

**Central Scotland.** BBC User Group: D. Davidson, 1 Roxburgh Place, Larbert, Stirlingshire FK5 4UE
**Inverclyde.** Inverclyde BBC Micro Users' Club: Robert Watt, 9 St John's Road, Gourock, Renfrewshire PA19 1PL.
Tel: Gourock 39967

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**Australia.** Ozbeeb Sydney, meetings North Ryde. PO Box 1030, Parramatta 2150.
Tel: day 635 4868, eve 868 4455
**Canada.** Atom Users' Group of Canada: John Wood, 812 Cabot Trail, Milton, Ontario L9T 3M8, Canada
**Canary Islands (Spain).** BBC Micro Club Tenerife: PO Box 560, 38000 Santa Cruz de Tenerife, Canary Islands (Spain)
**Eire.** Irish Amateur Computer Club: Austin Vaughan, 35 Monastery Drive, Clondalkin, Dublin 22, Eire. Tel: (01) 593112 (evenings)
**Eire.** OIFIG (Official Irish Forth Interest Group): c/o Hugh Dobbs, Newton School, Waterford, Eire
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**Netherlands.** Big Ben Club: J. Assies, Secretary, PO Box 177, 4670 AD Zevenbergen, The Netherlands
**Norway.** BBC INFO: Horten Ingenlorhogskole, Skippergt. 6, 3190 Horten, Norway
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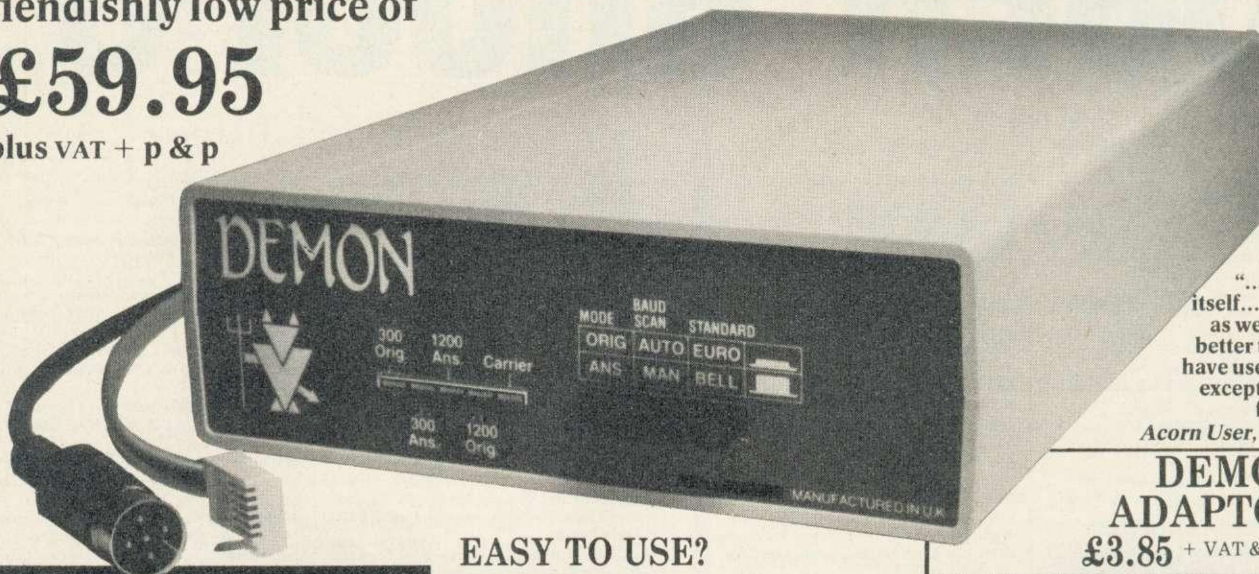
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**CP/M.** CP/M User Group: Diana Fordred, 72 Mill Road, Hawley, Dartford, Kent.
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**CHIPS:** new and unused 2764's, only £2.50; 27128 £4; and 62642P £5; postage included. Tel: David (0245) 57575 evenings.
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**SOLIDISK** 2.0 DDFS and utilities discs. Starbase ROM manuals. 10 DDDs discs. 7 programs on tape. Cost £200. Take £100 or new Electron. May split. Tel: Duncan (0632) 320537 work, 2748227 home.
**FOR SALE** sidewise ROM board £20, with manuals, and Acorn DFS ROM £10. BBC User Guide (unused) £7, onos'. Tel: John, Preston (0772) 796293 after 6pm.
**UDM** disc interface for BBC B. Brand new (used for one week only). Penultimate vision (2.0) – runs Elite, etc. £80 ono. Phone Peter on 01-534 2662 (eves). Will fit & test free of charge.
**BBC B** 1.2OS, excellent condition plus joystick and data recorder plus all leads. Sell the lot for £225. Wrote to V Price, 30 Llantwit Road, Neath, W Glamorgan, S Wales SA11 3LB.
**TEAC** disc drive, uncased with leads, manuals + utilities disc. Good condition. For use with BBC. £80 ono. Call Jeff after 7pm on 01-578 0106 (London).
**MODEM**/bargain. Unpacked Nightingale + Commstar communication software. Prestel/all databases 1200/75, 75/1200, 300/300. New, unused, will post for £130, saving over £30. Tel: (09363) 2090 to discuss evenings, after 4pm.
**FOR SALE** Sir Computers MK II ROM/RAM board with 16k sideways RAM fitted: £40. Phone 01-736 7714 and ask for Satvinder.
**WANTED** BBC model A (maybe in part exchange for Electron, in very good condition). Also VIC20 ROM cartridge. Any offers for either: Andrew Pink, 2 Firs Close, Winterslow, Wiltshire. Phone: (0980) 862450.
**OPUS** disc drive. Single sided, 40 track. Half price, £70. Tel: (0492) 49722.
**SEIKOSHA** GP100A printer, centronics interface. Graphics screen dump program included. Variable width pin feed. Perfect condition £99. Tel: Blackpool (0253) 54242.
**FOR SALE:** 400k. 40/80, double sided disc drive £145. Also, Watford DFS 1.4 £15 or both for only £150 ono. Tel: 01-445 1977. Chee, after 6pm.
**BBC B** with Acorn DFS. 3 months old, unused, in box with manual and demo tape, cost £469. Will sell for £400 ono. Phone: Blackpool (0253) 592151. Ask for Darren, evenings please.
**ATOM** colour board with 6-pin RGB socket and BBC-type board. £10 each or £15 for both. Worthing 36785.
**PACE** Nightingale Modem and Commstar communication ROM for BBC. Sell at £87. In excellent condition. Tel: 041-334 2166 after 6pm and ask for Steven.
**ACORN ELECTRON** with Plus 1, Sanyo cassette recorder, pair of LVL joysticks, books, software, complete with all leads. Worth over £300, sell for £150. Phone Sunderland (0783) 670451 after 5pm.
**TEAC** 40 track, 100k disc drive with formmater/manual/leads, £65 ono. 48k Spectrum £65. Mike, 86 Leicester Road, Quorn, Leics. Tel: (0509) 413590.
**ACORN ATOM,** 12k RAM, 8k ROM, includes software, PSU, manuals, etc. Hardly used, only £46. Phone: Dover (0304) 824508 for further details.
**BBC DFS** (disc filing system) for sale, just £70 (ono). Includes all chips. Ring Nigel on 01-385 2858 after 6pm.
**ACORN ELECTRON** with very good data recorder + loads of games, books, magazines and still under guarantee. Hardly ever used. Tel: Harrogate (522723 and ask for Tim.
**ELECTRON PEN PAL** wanted to swap ideas etc. Would like Scottish replies but not essential. Reply to Scott Mitchell, 32 Limetree Avenue, View Park, Uddingston, Glasgow G71 5HG, Scotland.
**PRISM 1000** 1200/75 1200/1200 direct connect modem with Prestel ROM, £60. Includes all leads. Unwanted prize. Phone: Dave on 061-430 2060.
**BBC B,** Watford DFS, Wordwise Plus, Forth, ds/40 track drive, manuals galore, all *Acorn Users*, many *Beebugs*, all notable games and applications, much special and primary educational software, suit school, £500. Tel: 021-382 3106.
**ACORN ATOM** wanted. Not needed working. Bromsgrove (0527) 31977.
**100k PHLOOPY** data storage system, interface, 2 cartridge, manual & cables. Boxed as new £60 ono. Ring Bolton (0204) 694397.
**ELECTRON,** cassette recorder, joystick interface, over £100 of software, magazines. All good as new. Worth £350, selling for just £145 (for quick sale). Phone: Guildford (0483) 575918.

**Acorn User has been alerted to the abuse of the free ad service and, regrettably, can no longer accept entries selling or swapping software.**

**ELECTRON,** joystick and interface, cassette recorder and loads of software. Bargain at £80. Tel: Leicester (0533) 707351.
**BBC B** OS1.2, data recorder, Amx Mouse package + colour Art, Graphics ROM, Sprite utility, software + magazines. Worth £700: Bargain at £450 ono. Telephone (0625) 829588. Ask for Miles.
**BBC BOOKS** for sale. All in mint condition. BBC Assembly Language, Discovering BBC Micro Machine Code, The BBC Micro, 40 Educational Games, Learning to use the BBC Micro. Phone Wayne on (0323) 846906.
**ELECTRON** Plus 1, Plus 3, Voltmace 3B joystick (all boxed with leads, etc.), £80-worth of original software, books, many magazines: £390. Very good condition, selling because I'm buying BBC. Ring Paul after 6pm on 01-359 2505.
**ACORN DISC** interface only £70. Double sided drive with leads, £90. Spare 27128, £8; spare 2764 £4. Write to M Bright, 36 Freckleton Drive, Bury, Lancashire BL8 2JA.
**ACORN DNFS** upgrade kit. New £75 ono. Acorn Music 500 synthesiser £180 ono. Canon colour printer, brand new, £350. Ring Medway 716962 (daytime only).
**SEIKOSHA** GP-500A printer for sale. Four months old, almost perfect condition. Reason: upgrading system. £125 ono. Ribbons £5. Ring John on 061-434 6251 after 6pm.
**PRINTER** Teletype ASR33 20MA loop, good working condition, spare cards and stand, £25. Texas TI994A Computer, as new condition, £30. 2 Mainsforth Drive, Billingham, Cleveland TS23 3RN. Tel: (0642) 566515.
**FOR SALE:** Omnibot radio control programmable robot, with hand controller, battery charger, tray, £75. Phone Stevenage 69612 after 6 pm.
**ACORN DISC** interface (1.2 ROM), brand new, unused (will fit free if needed), £80 ono. Phone Paul on (0206) 242013 after 6 pm.
**DUAL DISK** drive, 200K plus Acorn DFS Ehip. One and a half years old. Must sell, any reasonable price considered. Tel: (Dundee) 43111 (evenings).

**We've changed the format of the Free Ads so that we can clear the backlog and no longer have to carry ads over from one issue to the next. The Free Ads are carried in the magazine as space permits, so please allow two or three months for yours to appear.**

## FREE PERSONAL AD SERVICE

**Sell your old hardware or pass on information. Fill in the form below to a maximum of 32 words (one in each box) and send it to Acorn User Free Ads, 68 Long Acre, London WC2E 9JH. Use capital letters, and remember your name, address or telephone number. Without this full information, supplied on a separate sheet of paper, we regret that we cannot carry your Free Ad. This is a service to readers – no companies please. One entry per form only, and we cannot guarantee any issue.**

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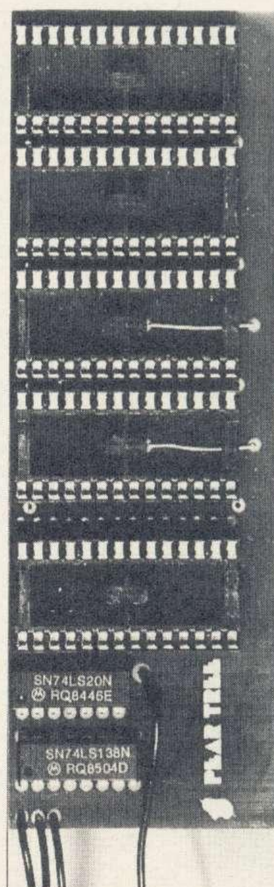
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**WANTED:** Plus 1 interface for Acorn Electron. Tel: Sheffield (0742) 890478.

**FOR SALE:** 40/80 track S/S disc drive with PSU, £75. Also colour monitor, ideal for word processing, etc., £130. Upgrading in both instances. Lodge Hill 49249 (after 7 pm).

**ATPL** sideways extension ROM/RAM board with 16K CMOS RAM fitted, for sale 12N due to upgrade to Solidisk system. Worth £60 new, will accept £40. Tel: Bradford 683717, evenings.

**BBC B** + DFS, 7 months old and in mint condition. Lots of software and tape deck, only £420, worth £514. Phone (0624) 815836.

**BBC B,** Amcom DFS, Kaga green screen monitor, Mitsubishi 80 track double-sided disc drive, Kaga KP810 printer, view, games, books, magazines, discs, and much more, cost £1,500+. Sell for £1,050 ono. Bude (0288) 4682.

**OLIVETTI** $5\frac{1}{4}$" 100-200K 40-track disk drive, £60. Wanted: Atom Lisp and Forth. Tel: Newcastle 091-2846294.

**BBC B,** green monitor, modem, Pace double-sided 40/80 drive, Plinth, Acorn DFS, Commstar ROM, joystick, speech interface. Lots of disc/cassette software, £650. Phone (0634) 721182 at weekends.

**PRINTER** for sale. Radio Shack DMP-100 (GP100A look alike), boxed with manual, £120 ono. Tel: Steve Tovey, 01-542 9674.

**NIGHTINGALE** modem for sale, under guarantee, £90. Tel: Tyneside 2662775.

**WANTED:** Wanted wanted wanted. Plotter drivers for the bitstik. If you have these, please contact me for an offer you can't refuse. Bloom, 2 Byeways, Twickenham. Tel: 01-894 7149.

**2 X 100K** full height dot disc drives. Bare £45 each. 2 x 200K double sided dot, £55 each. Raven 20K screen RAM board, £47. Eprom programmer, £40 or swap for modem. Phone Nottingham (0602) 733676.

**ACORN MUSIC 500** synthesiser, new in June. No time to use it! £170 ono, still as new. Ring Faversham 531453.

**LOOKING** for back issues of American computer magazines? I may well be able to help. Send wants list with SAE. Geoff Smith, 84 Edenfield Gardens, Worcester Park, Surrey KT4 7DY.

**INTEL** 8271 Chip. New condition, £75. Tel: Cambridge 321913.

**PORTABLE** programmable TI59 calculator. Magnetic card storage plus three ROM cartridges. Battery plus charger. Full documentation, working as new. Was over £200, sell for £90 ono. Tel: Bingham (0949) 39321.

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**WANTED:** Torch Z80 disc pack with or without software, reasonable price, must be in good working order. Phone David on (0324) 558692.

**BBC MICRO MODEL A.** 32K RAM, analogue port, user port, printer port, paged ROM system, Exmon ROM, cassette recorder and lots of software £175. Phone Jonathan Southowram, Halifax 59509.

**PENMAN** robot plotter. As new with cable for BBC, etc. Best offer over £200. Phone (0742) 342870.

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**SOLIDISK** 32K sideways RAM, with three solidisk utilities disks (volumes 3, 4, 8), £25. Tel: Smallfield (034 284) 2338, after 7 pm (Surrey).

**CUMANA** dual 800K 40/80 track disc drive with it's own power supply and nearly £1,000 worth of software. All for £450. Phone (05827) 69152.

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**STAR** DP8480 dot-matrix printer. Hardly used, with screen dump software, £160. Also BBC ECM extension ROM board, £18. MRM E00 DFS, £15. Phone Knutsford (0565) 3189 evenings.

**DRAGON** 32 with books, magazines and tapes, games and utilities, £110 ono. Tel: 061-688 5360.

**EPROMS** for sale. 2716, 2732, 2764, ex projects, eraised and tested. Tel: (0843) 33398 after 6 pm and ask for Don.

**PACE** Nightingale modem with Commstar ROM for sale. Perfect condition, four months old. Tel: (0472) 852148 (after 6 pm), or Prestel mailbox, 919992518. Ask for Robert. Any sensible offer taken.

**PL DIGITISER** and driver software, £55 ono, Smartmouth Speech synth, £30 ono. Please ring Mike between 4.15 and 11 pm. Steyning 815411.

**100K** or 200K disc drive and DFS wanted (preferably Acorn DFS) for Electron. Tel: 061-226 7320.

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**ATOM** 12K + 17K Eprom, monitor, toolkit, ROM pager, 5v PSU, software, books, articles, £75. Tandy CGP115 graphic plotter, pens, paper, £90. Both for £150. Tel: Charing (023371) 2209.

**QUINKEY** keyboard package for sale. £40 or £42 including post and packing. Tel: Henlade (0823) 443270.

**BBC B** Amcom B4150-DFS, Kaga/Taxan Kg12N, green-screen monitor, Kaga/Taxan KP810 dot-matrix printer, paper, Mitsubishi DS 807K-400K drive, View 2.1 word processor, Wordwise, games, advanced user guide, Forth, magazines, graphics, discs. Cost £1,500, bargain at £1,100 ono. Tel: (0288) 4682, Jonathan.

**ATOM** for sale. 12K, FP ROM, toolbox, via, PSU, Leads, manual, books, software, printer interface plus Microtalker speech synthesiser. £100. Tel: Cullingworth (0535) 272843 (evenings or weekends).

**IKON** ultradrive with power supply, filing system ROM and six tapes, including many games, plugs into user port, £80 ono. Tel: (0474) 73835 after 5 pm.

**SEIKOSHA** A100 dot-matrix printer with graphic screen dumps. Phone (Hull) 797276.

**D—DOS** Opus V3.45; brand new (2 months), 16K Eprom, Mail Order error. £85 ono. Phone David on (0295) 56311 (Oxfordshire) after 6 pm or Sundays.

**MODEM** Pace Nightingale plus Commstar ROM. All leads and manuals, £100. Tel: 051-526 8723, any time.

**BBC B** with DFS, £250. Torch CP/N card plus perfect software £200. Dual teac 40/80 DS drives, £200. Green monitor £50. Epson FX100, £300. The lot £950, will split. Phone (0256) 75717.

**UDM** DFS double density, simply plug in the chips. A real bargain at £50. Tel: (0634) 721182 at weekends. Ask for Julian.

**ACORN** 100K, full height disc drive, £50. 8271 disc controller chip, £45. Tel: Ampthill (Beds) (0525) 402679 any time.

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**ATPL** Sidewise ROM board, with instruction manual. £30. Phone Basingstoke (0256) 468997 after 6 pm or at weekends.

**MICROWRITER** Quinkey complete with interface, software, etc. Hardly used, £40. Micropulse ROM box, £45, hardly used. Richard Allen, 4 Arlington Close, Kingswinford, West Midlands DY6 9PP.

**ACORN** Atom disc pack practically unused, excellent condition, £100 or offers. Program Powers Utility ROM for Atom, £20 or offers. 62K printer buffer for computer with Centronics port, £80 or offers. Phone J. M. Bonnett on (0407) 810689.

**BEEB** complete DFS (8271) controller plus 40-track drive with all cables, etc., and full fitting instructions, or will fit if in the Cardiff area. £160. Tel: (0222) 864614.

**BBC B** 1.20S, DFS and ROM board £250. 6502 second processor and Hi-View £160. Teac 100K drive £50. Olivetti JP101 printer, £150. The lot for £600. Phone Steve (Bolton) 56794, after 7 pm.

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**SPEECH** synthesiser (Watford) for sale. As new, includes speech synthesiser, Talk ROM and manual. Will sell for £25. Phone after 5 pm (07875) 3591.

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**WANTED:** BBC B microcomputer. Must have Acorn disc interface and disc filing system. Preferably with dual disc drives, OS 1.2, and Basic 2. Contact Sue on (0733) 54232.

**EPSON** FX80 printer, excellent condition with dust cover, £195 ono. Tel: 01-722 1296.

**BBC B,** plus extras. One year old and little used, price £250. Ring Ken on (0895) 32197 or call at 209 Harefield Road, Uxbridge, Middlesex.

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**BBC B** computer 1.20S with DNFS 1.20 (disc interface) and free software, Has all leads, box and small sound extension. Any offer over £340 secures. Phone Keith after 7 pm on 01-777 4714.

**JUST STARTED** getting Acorn User? Complete your collection with my back issues. All issues from July 1982 to current for sale. £25 or best offer. Might split. Ring Andrew on (09277) 63142 evenings.

**WANTED:** BBC B. Michael Roberts, Woodford Green, Essex. Tel: 01505 0253.

**WANTED:** Acorn DFS. Must be complete and working. Also contacts wanted to swop info, tips, software, etc. Colour monitor also being sought. Reasonable prices paid. Please phone Peter on 01-968 3454 any time.

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**FOR SALE:** BBC model B, 5TL DDFS, Mitubishi 400K 40/80 double-sided drive, graphics + toolkit ROM. 25 software titles. Magazines, cost £1,000. Offers around £750. Phone Edware (Walsall) 640365 6-8 pm.

**BBC B,** Acorn DFS, Teac 40/80 track 400K drive, 32K Solidisk RAM card, + 20 discs with £4,000 software, many ROMs including view, Pascal, Disc Doctor, £650 ono. Also monitor/TV MT80 printer. Tel: Tim, Dorking 730076.

**ACORN** Electron with Plus 1 interface, two joysticks. Also interface for Quickshot joystick, cassette recorder, £110. Original software (including Elite), books, manuals and magazines, £240. Phone 01-773 0564 after 6 p.m. (Wallington, Surrey, area).

**ACORN** Electron, amber monitor, data recorder, joystick interface + Quickshot joystick, over £150 software + £30 books. Worth when new £470, accept £340 ono. Tel: 01-866 4594.

**DISC** interface, Opus double-density DFS with manual, £50. Tel: Gravesend (0474) 63503.

**EPSON FX80** printer for sale. Only used a few times, only £365, with free cable and NLQ program. Contact Preet on 01-575 0754 after 6 pm or after 3 pm on weekends.

**FAIRLY** new Electron user would like penpal to swop ideas, magazines, etc. If willing, please write to 16 Manse Close, Exhall, Coventry CV7 9NT. (Chris Dymock). Will try and reply to all letters.

**FREE:** Hobbit floppy tape system for buyer of my Seikosha AP100A printer, price £110. All leads, manuals, etc. Phone (0793) 871258 after 6 p.m. Buyer collects.

**MODEM** Prism 1000 with Modem 84 ROM software, cables and manuals. New, unused, £60. Tel: (0203) 371315 evenings.

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**PACE** Nightingale Multi-baud rate modem for BBC. Kept in excellent condition. Sell at £80. Tel: Steven, 041-334 2166 after 6 pm.

**ACORN** Electron, Plus 1, Acorn data recorder, £92. Original software, joysticks, all leads, Advanced User Guide, Electron User magazines. Original packaging + manual. All perfect condition. Tel: Wimborne (0202) 881447.

**BBC B** with DNFS, unwanted gift, £320 ono. Phone John, 041-632 1191 (Glasgow).

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**DISC DRIVE,** twin s/s with PSU, BBC cable (Technomatic), £240. Centronics 737 printer, cable, manual, £100. Watford ROM expansion board, £15. David Pears, Upminster (040 22) 29912 or 01-242 0901 (office).

**E00 DFS** by MRM £15. Solidisk 32K sideways RAM, £45. 35-track disc drive, suitable for BBC with Acorn DFS, £50. Tel: Stanford Le Hope (0375) 679533 evenings.

**COLLECTION** of Acorn User magazines to sell. Issues from November 1982 up to date. Also 3 Acorn User binders. Will sell as a set or separately. Phone Cardiff (0222) 753904 (evenings).

**MUSIC** 500 synthesiser. Mint condition, £150. BBC B 1.20s, perfect condition + Acornsoft programs (Elite, etc) + books & magazines, £220. Tel: 01-485 1394.

**TELETEXT** adapter, new condition, £150. Phone (07456) 89112 (North Wales).

**CUMANA** double disc drive for sale. Slim line CD200 $5\frac{1}{4}$" with integral power supply and utilities disc. As new; owner upgrading to 800k £230 (current price £295 new). Ring 01-948 3970 (Richmond).

**CUMANA** CS400, half height disc drive + PSU + formatting disc, manual, unused. Still in box, owner upgrading with Torch Graduate. £130 for quick sale. Fakenham (0328) 4265, (evenings).

**FOR SALE** Prism acoustic modem with Micronet ROM and leads. £40. Tel: Dursley (0453) 842826.

**EPSON** MX100 printer with manual – as new – £275. BBC B fitted with Acorn DNFS £345. (02403) 21702.

# FREE ADS

**FOR SALE** Seikosha GP80 graphics printer. Includes BBC table and paper and manual; £55 ono. Will deliver in the East Midlands. Tel: Andrew on Melton Mowbray 69013.

**BBC B** 40/80 disc, solidisk 8271/1770 double density interface, Solidisk sideways RAM, Exmon, TV stand, cover, joystick. Muck software including utilities, games, ROMs. Perfect condition, £700. Tel: (0452) 812523.

**WANTED** disc drive or interface for BBC-B. Tel: (Sunderland) 40856.

**BBC B** 1.2OS, Basic II, Opus DDFS, disc Doctor ROM, graphics ROM. £325 for quick sale. Also, Watford EPSOMmer, £60. Canon SS/SD disc drive with 15 blank discs; £65. Phone Guy on (0225) 859401.

**DISC DRIVES** Olivetti 5.25" single sided look; £70. Double sided look; £90. Both metal cased and including all BBC cables and utility discs. Phone Rugby (0788) 817932.

**DISC DRIVE** TEC 100k single sided 40 track, plus utility disc, manual and all leads; £90 ono. Tel: Kennoway 352123 after 5pm, or write to Alan Love, Glenleven, Milton Road, Windygates, Fife, Scotland.

**DISC DRIVES**, dual, double-sided, 80 track, little used; £200. Also Acorn Electron, boxed. All leads, £100 ono. Call or write to: D Edwards, 28 Princess Road, London NW6 (evenings and weekends).

**BBC** 100k 40 track Teac disc drive. Plug in and go: manual, leads, utilities included, plus other software. Six months old, mint condition. Upgrading prompts sale. £80 ono. Tel: 01-674 9583.

**ACORN** Econet file-server (level 1) and printer server. Cost £121. Unopened. Gift at only £60. Tel: (Mendlesham) 7130 (evenings).

**WANTED** cheap Acorn Atom FP ROM, UIA and BBC Basic board. Any condition considered. Wanted for school project. BBC Basic not important, will consider without. Tel: Reading (0734) 712348.

**HOBBIT** micro-tape drive for the BBC micro. Genuine, cheap alternative to costly disc-drive/interface/DFS. Includes ROM Operating System and instruction manual. Cost £119. £54 ono. Tel: Blackpool (0253) 64209.

**BYTE** wanted: 1980 (all); Jan 1982; May 1982 to Dec 1984 inclusive. Kilobaud/Microcomputing wanted: Oct 1980; Feb, June 1981; Oct, Nov, Dec 1982. Smith, 84 Edenfield Gardens, Worcester Park, Surrey KT4 7DY.

**T800K** (1600k double density), 40/80t, double sided dual Mitsubishi drives, DFS ROM, 35 Solidisc sideways RAM software (no rubbish!) Selling for £399/swop for upgrade Z80 second processor: M Atkinson, 101 Chepstow Way, London SE15.

**BBC** DFS ROM £10. Basic ROM £5. Teac 55F disc drive s/sided 200k 40/80, cased, etc; £130 ono. Phone Paul (0293) 515201.

**48K SPECTRUM**, recorder light pen, £150 worth of books, taped magazines, ZX printer, amplifier. £220 ono, or swap for APTL Sidewise and/or ROM by Beebug, Computer Concepts or Acorn, etc. Tel: 01-205 3341.

**FREE** Advanced Home Computer Course 1-30 in binders, and other books when you buy any Oric Atmos 48k + 7 games. Boxed, under guarantee, £75 ono. Phone Martin, (Slough) 43805 (evenings).

**ATOM** 38k, fitted 32k Eurocard PSU bus, VIA, FP, printer interface, ROM pager, toolbox, Wordpack, and manual. Ideal for wordprocessing, £120. Tel: Haverhill (0440) 702412. Ask for Paul (daytime).

**48K ORIC** Atmos plus 3" disc drive and colour plotter. Cost over £550 new. Will sell for £200 or near offer. Phone James Chong on Basingstoke (0256) 850802 after 6pm or weekends.

**COMPLETE** set of Micro User magazines. Fully bound from issue one. Cost £46, sell for £30 (plus postage). Paul Martin, Phone (0843) 61448. 3 Birch Close, Broadstairs, Thanet, Kent CT10 2NF.

**EDUCATION:** wish to swap material for secondary work, all subjects but especially physics, biology, geography and maths. Only BBC. Non-copyright. K Donert, Common Room, Downside School, Stratton-on-the-Fosse, Nr Bath BA3 4RJ.

**FOR SALE** Acorn BBC DFS kit (complete), Canon ss/40tk drive (no PSU), Cumana ss/40tk. Drive (c/w PSU), (guaranteed) £300 (will split or swap for Z80/6502 2nd proc). Tel: Peter on Soton (0703) 898889 evenings only.

**BBC B**, DFS, Kempston joystick, 40 games discs, £345. Gumana CSX400S drive £145; Epson RX80, £150. Juki 6100 with spare daisywheels, £275; cassette player, £10. All as new. Ring Richard on (0332) 668076.

**PEN PAL** wanted for swapping ideas, tips etc. I have BBC B and speech chip. Tel: Weybridge 52634 after 4pm. Write to Stuart parker, 66 Hillcrest, Weybridge, Surrey KT13 8EB.

**ATOM** sales: disc interface, manual, chips, (excluding 8271), supports BBC drives, £35. MK2 colour board £20. Books: Getting Aquainted; Atom Magic; and Wake Up Your Atom, £3.50. Phone Steve Allen on (0752) 776082.

**ATPL ROM** board with HCCS Forth and printer ROM, £55. Dave Loach, (0235) 20005 (after 6pm).

**FOR SALE** Acorn Electron, Plus 1, over £60 software inc. Lisp, View ROM, Electron User's manuals, etc. All as new. Sell for £230 ono or swap for BBC B. Tel: (0604) 410721.

**DUAL** 100k disc drives. LVL, in dual case, very quiet and reliable. Upgrading to DS80trk. Drives cased and cables. Offers around £140. Tel: (0462) 686834 evenings.

**BBC B OS** 1.2 + DFS + Shugart disc drive + 50 unused discs + Acorn graphic printer + ATPL ROM with ROM + £1000+ of extensive s/w, + books + extras/ Exc cond. £799. Nordmende 14" colour VDU £99. Tel: 01-892 6575.

**DISC DRIVE.** 40 track single sided half height teac drive, powered from Beeb. Comes in perfect condition with manual, formatting disc and 10 blank discs. Only £70. Phone Mark on (0707) 335949.

**BBC B**, Acorn DFS, 200k disc drive, tape recorder, joystick, toolkit + TDROM ROMs, software on disc + tape, books on programming. Only £500. Tel: Stoke-on-Trent (0782) 644102.

**BBC B** 1.2 OS, Acorn DFS, Teac disc drive, Epson RX80, F/T joystick, cassette deck, discs, software, books, £600. Clayton (0652) 648661 Extension (day) 227; (eves) 258.

**EPSON.** ½ height double sided 40 track disc drive. Little used 2nd drive. Includes utils disc and leads, etc. Wanted: pen pals to swap tips etc. Tel: Phil Sheffield 48089 after 6pm.

**WANTED** Cumana disc drive 800k dual double sided 40/80 track switchable (BBC). Tel; 091-417 3989 or write to Auson, 112 Stockley Road, Barmston, Washington, Tyne and Wear NE38 8EQ.

**BUSINESS SYSTEM** BBC B 1.2, Romex board, wordwise plus, Starbase, complete integrated accounts package, Amx Mouse, dual 3" drive, plus utilities and software, manuals. Work abroad forces sale. £1100 ono. Nigel, 01-561 8001.

**BBC B** with Acorn DNFS. Also Viglen 400k double sided drive, 32k Solidisk sideways RAM, Beebug Toolkit, joysticks, monochrome monitor and discs. Home use only. Some software, books, mags, etc. £550. Tel: 01-748 0837 (evenings).

**DISC** FILING SYSTYEM – Acorn recommended – for half new price, £50 ono, free fitting (Glasgow). phone 041-639 5110 and ask for Andrew.

**ELECTRON**, 2 months old, Mushroom Card, Starmon ROM, EB printer interface, Elite, couple of books. Bargain at £100 or may consider splitting. All boxed. Reason upgraded to Beeb! Ring David, on Ilkley (0943) 609866.

**FOR SALE** Phloopy tape system in good condition, with two tapes. Reasonable offers considered. Ring Congleton (0260) 274780.

**IS THERE** any Beeb or Electron owner who is reasonably competent in machine code, willing to swap tips and ideas? All letters answered. Write to K Price, 26 Stane Close, Bishop's Stortford, Herts.

**FOR SALE** Oric 48k plus nine programs and two books. Price £60. Phone Hartlepool (0429) 222149.

**BBC** model B + DFS, Solidisk 16k SWR, Solidisk double density DFDC board, books + a wide range of ROMs and software. For further details. Phone Andy on (0742) 461203.

**BBC B** with Watford 800k dual 40/80 track drive. DFS, ROM extension board, Wordwise & View ROMs, printer driver, cables, discs galore, books, need space for another coputer. What offers? Why not Phone Radlett (09276) 5481.

**FOR SALE** UDM DDFS £10. Also Shinwa CP80 printer costs £200+/ Selling for £175 ono. Both items hardly used. Phone Y Grewal on Basingstoke (0256) 57643 before 8pm.

**WANTED:** BBC disc owner (40 opr 80 track) to exchange programs, etc. Please contact James Schumann, Oak Lodge, Common Lane, South Wootton, King's Lynn, Norfolk PE30 3HW. Tel: (0553) 671108 after 4pm.

**BBC B** 1.20s, disc only (cassette loading problems), CUC DFS (fully compatible) with Viglen tall 40 track disc drive. Used in small business until purchase of B+. A snip at £400. Tel: Brixham (08045) 3603.

**WANTED** circuit diagram for Genie 1 EG3003, and Racal Milgo MPS3021 modem, original or copy. Also RGB conversion details for Philips KT3. Contact Andy on Kidlington (08675) 78398 after 6pm or at weekends.

**HAZECTINE**, monitor, double cassette drive and keyboard. One time business computer made redundant. Good home wanted, £45. Will separate. Phone Durham 701466 after 4pm and ask for Mr K Simpson.

**TELETEXT** adaptor at an unbeatable price of £85. Only 3 weeks old, supplied with ROM. Phone Borkway 206 and ask for Damon.

**ATOM** 33k including Timedata board, F.point, 6-way ROM board, Wordpack, Disatom, Screen ROM, 5V/5A PSU, speech synthesis module, Acorn disc pack, green screen monitor. Highest offer (will split). Tel: (0282) 38546.

**BRITISH MICRO** Grafpad. Hardly used. Includes CAD1 and CAD2 software, £90 ono. Acoustic modem, £30. Wanted: colour monitor. Phone (0225) 27066 evenings.

**BBC B + DFS** ATPL ROM board, Iso-Pascal Hi-Basic, 6502 2nd processor, double 40/80 d/s disc drives, 12" green monitor, Kaga Taxan printer + paper, books + desk. Guaranteed six months. £1400 ono, in perfect condition. Phone Irma on 01-800 2888.

**BLANK 2764** EPROM £3, P&P 30p; Sharp MZ80k £120 ono. Haigh, 36 Pightle Way, Lyng, Norwich, Norfolk NR9 5RL, or phone Norwich 872361.

**WANTED:** contact in Britain to exchange ideas and programs for Acorn Electron. Write to Steven Hoven, Siemensstraat, 1221, CR Hilversum, The Netherlands.

**PRINTER** C-Itoh 1540P 9 × 7 d/m Tractor 4" to 15" 120CPS, no graphics, paper and manual. £80 ono. Aylesbury 36158 between 3.30pm and 8pm, any day.

**I OWN** a BBC/B and would like a penpal to exchange news, programs and software with. Write to Dave, 12 Harrington Street, Gorton, Manchester M18 8UQ or phone 061-231 1895.

**KENDA** professional double density disc operating system. Gives CP/M type commands and requires no user RAM £70. Tel: (090) 567488.

**THIRD-HEIGHT EPSON** 200k disc drive. 40 track double sided. 6 months old, rarely used. £120. Tel: (0742) 848089 after 7pm and at weekends.

**TORCH** Z80 processor pack + Perfect software, manuals, fitting instruction £160. Phone 0634 681006 after 7pm for details.

**DOUBLE DENSITY** disc upgrade by LVL, includes DFS. Sensible offers (from about £50) or exchange deal with colour printer/plotter. Phone (0952) 597748.

**ACORN** Z80 second processor as new, boxed, complete with software, £299. Phone Newton-Le-Willows (09252) 3262.

**ELECTRON** joystick interface by Power Software only £10. Mint condition. Fits 9 pin joysticks, Atari style. Phone 061-643 9179 after 6pm (Middleton). (Its also been upgraded to Mark II).

**WANTED:** contact in Britain with other BBC B users. Exchange hints, tips, software, etc. Write to Paul Stevenson, 19 Marland Hill Road, Sudden, Rochdale, OL11 4PQ.

**FOR SALE:** complete disc system comprising Teac 55E single-sided 40/80 track drive, Viglen (CUC) DFS interface, manual utility disc, cables, five spare discs. £170 or offer. Tel: (0273) 602303 after 7pm.

**ELECTRON** in box with leads, dust cover, computer cassette recorder with remote lead. All Elbug mags, Electron User vol 1 in binder. over £300 software including Elite, over £20. Books. £195 ring Ian on 01-881 3501 after 4pm.

**FOR SALE:** Protek 1200 modem with BBC interface and software. Unwanted gift. A bargain at only £50. Phone Torquay (0803) 27906, Evenings only.

**BBC-B** Acorn DFS, CUB monitor, twin SS/40/track Viglen drives. Prism 1000. Loads software, floppies, books, etc. £700 ono. Phone 021-350 7686.

**WANTED** BBC owner pen-mate to exchange knowledge and software. Gal Bitton, Smilansky 23, Natanya 42431, Israel.

**BBC B** 1.20S Cumana disc drive 100k. Sanyo colour data display plus stand, Smith cassette recorder. All cables, joysticks, manuals. Accept £300. Phone 01-603 5854 (W London).

**SPEECH SYNTHESIER** for BBC B £20; cost new £40. Also lots of software. Phone Esher 62825 and ask for James.

**ELECTRON** with Plus-1, reset switch, dust cover, £50 of original software including Elite, with all manuals and leads. 12+ ,magazines. Perfect condition. £150 ono. Hoddesdon, Herts. Phone (0992) 466953.

**DISC DRIVE** 40 track Shugart single sided, as new, £70 ono. Write to Steve Van-Aardt, 4 Cheavley Close, Weyhill Road, Andover or phone (0264) 54949 after 5pm.

**BBC B** Acorn DFS, Wordwise, Pace 100k 40 track drive, Epson Rx80, Sanyo Med Res green screen moniter. £600. Phone Chris (evenings only) on 061-491 1520.

**LVL** 100k disc drive in twin case £100 ono. LVL double density interface £60 ono. Both items hardly used. Phone Adam on (04484) 3225. Wanted – BBC A or B. No more than £180.

**ELECTRON USER** in Basingstoke wants contacts in UK to swap info, tips, software etc. Please write to: Matthew Ball, 2 Kempshott Gardens, Basingstoke, Hants RG22 5QU.

**BBC B**, 1.20OS, Basic II, Acorn DFS, speech, £250. ATPL board, 16k RAM, £30. Two 100k discs, cables, discettes, £65 each. Prism 1000 direct modem, ROM software, £50.Tel: (0705) (Waterlooville) 258093.

**BBC/B** with user guide, Welcome tape, TV lead and tape cassette lead. £240 ono. Tel: (0264) 810414. Not Sunday or Monday.

**PRINTER** Olivetti ink-jet, as new. Complete with graphics dump £175. Tel: (0303) 77309. After 6pm or write to 63 Morehall Avenue, Folkestone, Kent CM9 4EF.

**ELECTRON**, Plus-3 (disc drive + DFS), £80 S/W, £15 books, manuals, leads, £15 discs. All in excellent condition. £270 ono or swap for BBC B + DFS in same condition. G Dennis, 54 Wood Vue, Spennymoor, Co Durham DL16 6RF. Must live locally.

**DISC DRIVE:** Cumana 40-track single sided with integral power unit; little used, very reliable. Leads, manual formatting disc and 10 discs of programs included, £90. Tel: 01-684 3051.

**WANTED** for Acorn atom. Disc drive, toolkit ROM, and software. Please send details to Ian Bowe, 96 Dukes Avenue, Theydon Bois, Essex CM16 7HF or P hone Theydon Bois (037881) 3488.

**IKON** Ultradive fast tape system with latest ICOk OS ROM which emulates most DFS commands. Complete with 8 data certfied mini-cassettes. Cost £135 but only now £70 ono. Tel: John (Northampton) (0604) 411097.

**DISC DRIVE** for sale. Opus double sided 200k 40 track, £100 ono. Ring Peter Evans on Guildford (0483) 810667.

**ULTRADRIVE:** help needed. Frustrated owner requires information on transferring software to ultradrive. Will purchase program or details. Contact Nigel Carey, 166 McKee Avenue, Finglas East, Dublin 11, Eire. Phone 01-341 881.

**OFFICIAL** Acorn speech synthesiser. Unwanted gift. Brand new. Never been used. Full fitting instructions and operating manual. Cost £55, sell for £25. Tel: 051-548 4403.

**BBC B** with disc interface, boxed, as new. Bargain £250. Or exchange for quality pair of observation binoculars 20 × 80, etc. Tel: 04955 58108.

**DISC DRIVE** Opus 5802S 80/40 track hardware switchable for sale £120 ono. Bennet, 48 Fairway, Copthorne, Sussex RH10 3QA. Tel: Copthorne 713371.

**NIGHTINGALE** MODEM plus Commstar, c/w manuals etc, £100. Micropulse ROM box, £40. System ASM ROM c/w manual, etc, £25. Near offers considered. Phone IOW (0983) 406703.

**100K DISC** DRIVE & utilities with Disc Doctor ROM and manuals. Lots of books etc chucked in. Asking £110 but will accept less. Phone Oliver in Chiswick, London W4, on 01-995 9485.

## ACORN USER ADVERTISEMENT PAGES – JANUARY ISSUE

# SMALL ADS

■ **Juki 6100:** Hardly used in six months from new. Phone JG at Ware, Herts (0920) 3122, daytime. £300.

■ **Microspacing** printer drivers for 10/12/15 or proportional text, individually produced for suitable wordprocessors and printers. New Horizon Computer Services, PO Box, 35 Plymouth PL1 1UZ.

■ **Halbars Weather Satellite** imaging station. Built and ready to go. Aerial, receiver, digitiser software for BBC, £230 including VAT. Unit 1, Bury Walk, Bedford MK41 0DU.

■ **To hire** a BBC and peripherals, ring 01-607 0157 or 01-997 6457. Computer Hire Services, 294a Caledonian Road, London N1 1BA.

■ **27128-250ns** £3.25, 2764-250ns £2.25, 6264LP15 £3.50. All prices inclusive. For these and other components write to P & R Hardware, 134 Manchester Road, Swinton, Manchester M27 1EP.

■ **BBC model B 1.2OS** with 100k drive and 40 discs plus AMX Mouse, joystick, tape recorder, dust cover, Beebmate ROM, disc box, leads. £525 ono. Tel: Rickmansworth (0924) 259252 after 5pm.

■ **8inch disc DFS** for Beeb. ROM + manual £45 + £1.50 p & p, manual only £3. SAE for details. Vogan Products, 21 Grove Road, Hazlemere, Bucks HP15 7QY.

■ **BBC B**, 800k disc drives, Acorn Z80, 128k Solidisk, Kaga monitor, Epson printer, CP/M and BBC software, magazines. Only £890; will split. Phone (evenings) Watford (0923) 46284.

■ **1986 Games** for the BBC and Acorn Electron. Inu and the Heist: Both games £5. Cheque/PO to MR J, 64 Reva Road, Broadgreen, Liverpool.

■ **Computer exams** preparation: use 200+ question data bank. BBC 40/80 (state which) track disc £13.50; Econet version £27.50. BBS, 4 Chaomans, Letchworth, Herts SG6 3UB.

■ **Astrologers:** calculate equal House Birth Chart, Aspects, Part of Fortune, see map on screen in minutes, £7 (cassette). Signsolve, 5 Brambleside, Wildwood, Stafford ST17 4QW.

■ **Centronics 739** printer ROM. Dumps colours shaded, *Command printer control, Worldwise Fkeyset, manual, utilities (tape or disc) £25. Electrocomp, 5 Polden Close, Cove, Farnborough GU14 9HN. Tel: (0252) 510486.

■ **Custom build**/small business/home user. We can custom build cables & connectors, T-switches, gender changers, etc. Printer stands, etc. Send your designs/wiring diagrams or enquiries to: 48 Fairwater Avenue, Welling, Kent.

■ **Amber 2400** dot matrix printer. Hardly used prints on 3″ paper roll. Five rolls supplied + BBC parallel cable. £65. Telephone (0495 25) 4889, anytime (Gwent).

■ **Kaysoft Christmas Special.** Two action tapes with menus for BBC. Action 5: Five super space games – Spacehash, Hellthrust, Destroy, Liquidate, Break-up – £6.50. Action 10: Survival, Minemaze, Bailout, Trapped, Annihilate, Asteroids, Crashpad, Gogetem, Bombed, Fire – £10. Return post SAE for lists of games and utilities. Cheques/POs to Kaysoft, c/o Longace Ltd., Unit 1, 5 Military Road, Colchester, Essex CO1 2AA. Tel: (0206) 572948.

■ **EPROM** erasing and programming service. Very low cost. Also, Basic programs entered onto EPROM. EPROM available with CALCULATOR and METRIC CONVERTER programs for BBC B. Send SAE for details. Contact A. Smith, 11 St. Clement's Close, Ardsley, Barnsley, South Yorkshire S71 5DD.

■ **Graduate** G800 IBM upgrade for BBC micro. Complete with Tsion Xchange. As new, X-Demo, £475 inc. VAT, retail £999. Tel: (0954) 30817.

■ **Chartwise.** Pop music database holding the top ten UK singles for every week 1960-69, 1970-79. Powerful instant information retrieval by date, title or artist name search. Available BBC B cassette/disc (same price). 'Sixties' £7.95, 'Seventies' £7.95 inc. p & p. Ideal gift. Dotsoft, DeptA, PO Box 46, Hitchin, Herts SG4 0XQ.

■ **Powerful automatic Disc Cataloguer.** Reads disc catalogues into random access index. Thereafter, can display the catalogue of any of your discs in seconds, or find any program on your discs. Facilities include: edit, sort, file type, disc free space, printer output. A comment can be stored with each program record. Plus free Year Planner, same disc. Acorn DFS. £7.95. 40/80 track. Toto Software, 24 Hazel Bank, Milton-of-Campsie, Glasgow G65 8JG.

■ **Person** required for occasional work using Wordwise. £1.70/1000 words. Send sample showing capability with Wordwise to D. J. Martin, Electrical Engineering Department, Salford University.

■ **Problems?** R-SOFT utilities can help you! **1. How-to:** An essential collection of software and instructions for frustrated new disc owners who want to move their programs to disc. **2. Nutcrakers:** tape2tape + tape2disc + disc2disc + disc2tape. **3. Rompull** and **Tapedump. 4. Automatic Disc Menu:** Includes a sideways RAM version, can boot from ROM, works with 2nd 6502. **5. Autosol:** Will automatically boot your Solidisk with a preselected list of ROMs. **6. SWROM*:** puts your Basic/machine code programs in ROM format. **7. RFS-Generator:** Generates ROMs for the *ROM filing system. This does not use DFS workspace and is an ideal tool to run nasty programs from disc. All above packages £5 each; **How To + Nutcrackers:** £9. **D-Master:** Superb disc copier (is unprotected): £7. Many other utilities: Send for our list (SAE please). R-SOFT, 22 Marriotts Close, Felmersham, Bedford MK43 7HD. Tel: (0234) 781730.

■ **Did you see** us at the Christmas Show? French, German and Spanish verb and vocabulary teaching programs for the BBC B. Fun, challenging, exciting. Phone or write to: MedStat Ltd., City House, Maid Marian Way, Nottingham NG1 6BH. Tel: (0602) 411120.

■ **Bed/Breakfast/Bytes.** Enjoy rural countryside taking introductory/refresher course in computing or wordprocessing (Wordstar). Instruction by professional teacher. Contact: Mrs G. Lyon, Winton House, The Green, Upper Quinton, Nr Stratford, Warwickshire. Tel: (0789) 720500.

■ **Electron ROM** expansion unit. The 'EPROM Plus' uses the Plus/1 ROM slots to allow 4 8k/16k ROMs to be individually selected. Many Beeb ROMs are compatible. Price £15.95 incl. for 1, £27.95 for 2. Expandor Systems, 99 Staley Hall Road, Staley Bridge, Cheshire SK15 3DP. Cheques payable to P. Giblin.

■ **Stocktaking** on BBC B(40 track disc). Menu driven, counts entered and/or displayed as dozens or straight count. Figures saved and re-loaded as required. Prints results and counting sheets (Epson compatible). Ideal for pubs, clubs and similar. Pays for itself – £25. NYBBLES, 1 Silverdale Drive, Guiseley, Leeds LS20 8BE.

**We must remind advertisers that we cannot carry advertisements which incite readers to break the protection and therefore copyright of commercial software**

■ **Back-up** your valuable protected discs using Twin, now upgraded and cheaper too! Handles deleted data, non-standard sectors, CRC errors, etc. £7. J. E. Connett, Dene Croft, Westcott Street, Westcott, Dorking, Surrey RH4 3NY.

■ **Ladybird** – cheerful counting and addition to 9. Used in schools. Age 4+. Concept Keyboard version available. £6.50 (40t disc £7.50). NYBBLES, 1 Silverdale Drive, Guiseley, Leeds LS20 8BE.

■ **Hackers Phone Book.** Telephone numbers and guide to bulletin boards, mainframes, listed and unlisted, worldwide, £6.75. B. L. Sothcott, 56 Waterloo Road, Freemantle, Southampton.

■ **People's Software.** 10 Lawrence Rd, London SE25 5AA. 3 packages for BBC micro with disc drive: Database, Wordprocessor, Spreadsheet: £5 each. Before ordering, send SAE for details.

■ **'Tape-to-disc'.** Do you have Vine-T2D ROM? 'Grapes' converts your files to run on other BBCs which have a Vine ROM installed: only £5. R-Soft, 22 Marriotts Close, Felmersham, Beds MK43 7HD. Tel: (0234) 781730.

■ **20 high** quality educational programs for the BBC B. Subjects include Physics, Maths, Chemistry, Biology, History and Geography. Only £7.95 (tape). Ranjan, 3 Wensley Close, Harpenden, Herts AL5 1RZ (immediate despatch).

## SMALL AD SERVICE

Please include your cheque for £11.50 (inc. VAT) made payable to Redwood Publishing. This is the standard fee. Don't forget your name, address or phone number. Send cheque plus form to Acorn User Small Ads, 68 Long Acre, London WC2E 9JH. Please print clearly.

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# ACORN USER'S

## DIARY

# 1985 Review: Year of the RAM

And so it came to pass, as predicted, 1985 was Year of the RAM. Year of the Bump too – Commodore laid off staff, Sinclair survived (ha, ha) a takeover bid by Cap'n Bob, and the Hoover C5 cleaned up on portable bathtubs. According to Jane Burned (a friction writer, with the *Sunday Slimes*) Acorn didn't do too well either. But you can't believe all you read in the papers.

### JANUARY

**1** Chris Curry gives New Year speech to the Commonwealth: 'Another bumper year – reserves of Electrons never higher – looking forward to heavy investment'.
**2** Jane de la Barbed reveals EEC Electron mountain at Wellingborough. Bob Jellied-off launches 'Elks for Ethiopia'.
**8** Acorn denies Communicator for the first time.
**15** Hermann announces all Acorn personnel to go on three-day week 'because of Christmas excesses'. Chris shows the way: 'Absolutely no new appointments.'
**22** Alex Reid appointed new chief executive.
**27** C5 launch. Guarantees future of micro-drives.
**28** Acorn Business Computers launched.
**29** ABCs unlaunched.

### FEBRUARY

**3** Wot! Still no Plus 2s? Acorn Abuser reveals Electron Minus 1. Acorn share price plummets.
**12** Electron with bundled Minus 1 sells for £130.
**20** Olivetti buys 49.3 per cent of Acorn. Mr Hermen exudes 'guaranteed long-term security.'

### MARCH

**7** Hermann's value down £80m at 43p.
**23** First C5 of spring reported in the *Times*. Disqualified through being dead.

### APRIL

**1** Shares rally.
**13** Acorn Cambridge Workstation not launched.

### MAY

**1** Acorn launches BBC B+. Everyone loves it: 'Where's the 12MHz CPU?' – BS, *AU*; 'But that's only twice as much memory' – GK, *PCW*; 'Worse than useless' – JB, *Sunday Crimes*; 'This is not a BBC Microcomputer' – *Elite*; 'What do you mean *View* won't work?' – RMcM, Acornsoft.

### JUNE

**3** New MD Alex 'UB40' Uboldi moves in. 150 employees move out. Remainder change names to sound Italian, wear sunglasses and carry hand-bags.
**5** Acorn Cambridge Workstation not launched again.
**10** New game from Vector Marketing. Most realistic simulation of running Acornsoft. Retails at £2.5 million.
**26** Acornsoft moves out of Betjeman House offices.
**28** Furniture arrives at Newmarket Road office. Computers held hostage in Italian removals van.
**29** Chas 'Rambo' Lister raids removals van with squad of *Elite* commanders. Computers freed. Casualties reduced to one disc drive in deep shock.

### JULY

**1** David Actionless joins *AU* staff. Redwood Econet crashes.
**2** Well-known double act Anti-aliassed Quinn and Smith on half-day week.
**7** Bruce from Nuncle reveals *Basic Editor* works on all Beebs, Electrons, Atoms, System 3s and Z80 second processors.
**11** Paul 'Cohmal' Fellows threatens to sue *Acorn Useless* for claiming *Editor* works on Z80.
**16** Micronit accuses *Acorn User* of software piracy.
**17** Tony Defender-of-the-faith Quinn accuses Micronit of telephone tapping.
**18** New editor for Micronit. Acorn Abuser strikes again!
**25** Third Acorn User Exhibition. 200,000 people queue in the snow for 15 days to suffocate in Baked-bean-can. Pascal Fellows catches Brucey. Basically Edits Brucey's nose.
**31** Acorn Cambridge Workstation really launched.

### AUGUST

**1** Isobel MacJockroach joins *AU*. Dear Kitty escapes letter opening and phone.
**2** Acorn claims first RISC machine in world with ARM.
**8** Acorn Abuser's *Sunday Crimes Business News*.
**11** Jollivetti takes over Acorn.
**12** *Sunday Times* orders 50 Acorn Abusers.
**16** Canadian tractor driver wins Acornsoft Business Game.
**17** Eleventh new MD of year Canadian David 'Call me Brian' Long teams up with finance man Brian 'Call me David' Short to sort out Acorn.
**20** Jane Bird becomes Innovations editor of *Sunday Times*. Paper wins Creative Promotion of the Year Award.

### SEPTEMBER

**5** BBC B+128 discovered behind Acorn stand at *PCW* show. Elks at £99.50.
**21** Acorn joins competition to think of a name for educational standard with Thomson and Olivetti. 'MSX 2' favourite.
**23** Dealer manages to fit 128k upgrade board.

### OCTOBER

**20** Sinclair Vehicles crashes. C5 free with every QL.
**23** 'I'm in charge' Quinn and *Popeye* Champ Actionless visit Holland for Ding Dong Club show.

### NOVEMBER

**1** Acorn launches massive advertising campaign. BBC sales steady.
**13** Fleabug 'computer club' tells readers not to go to Acorn User Christmas Show.
**14** December *Acorn User* appears. Nobody goes to Micro Re-User Show (again).
**15** Acorn board takes out contract on Tony Quinn. Horticultural Apathy – not even Mike 'still growing a ginger beard' Bibby goes to Re-User Show.
**16** *Who Dares Wins* on Channel 4 mentions Acorn.
**18** BBC sales boom.
**24** Christmas Show. Westminster brought to a standstill.

### DECEMBER

**12** January *Acorn User* hits the streets.
**13** Acorn share price jumps. *AU* offices beseiged by calls for early copies of *Elite* commander editor.
**25** Prince William becomes *Elite*.

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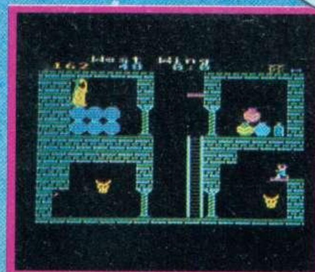
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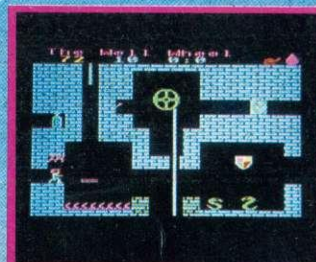
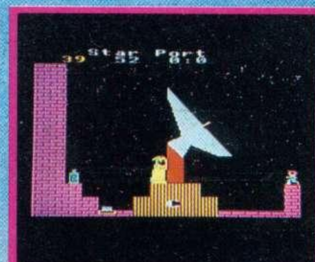
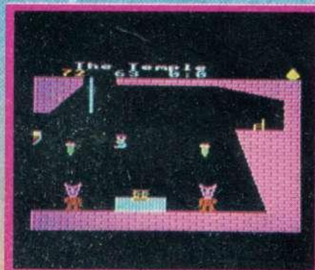
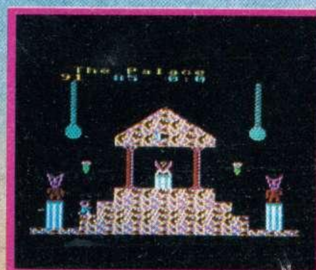
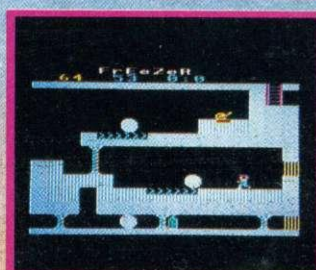
STARTS DEC. 1st
NO CHARGE
UNTIL JAN 1st

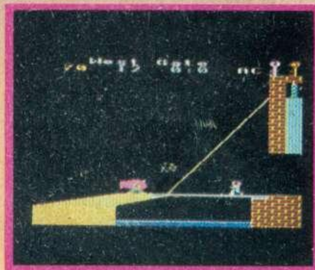
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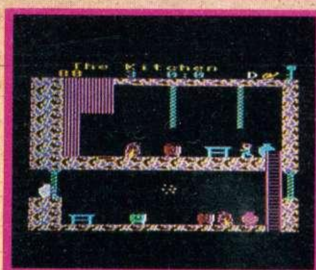
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